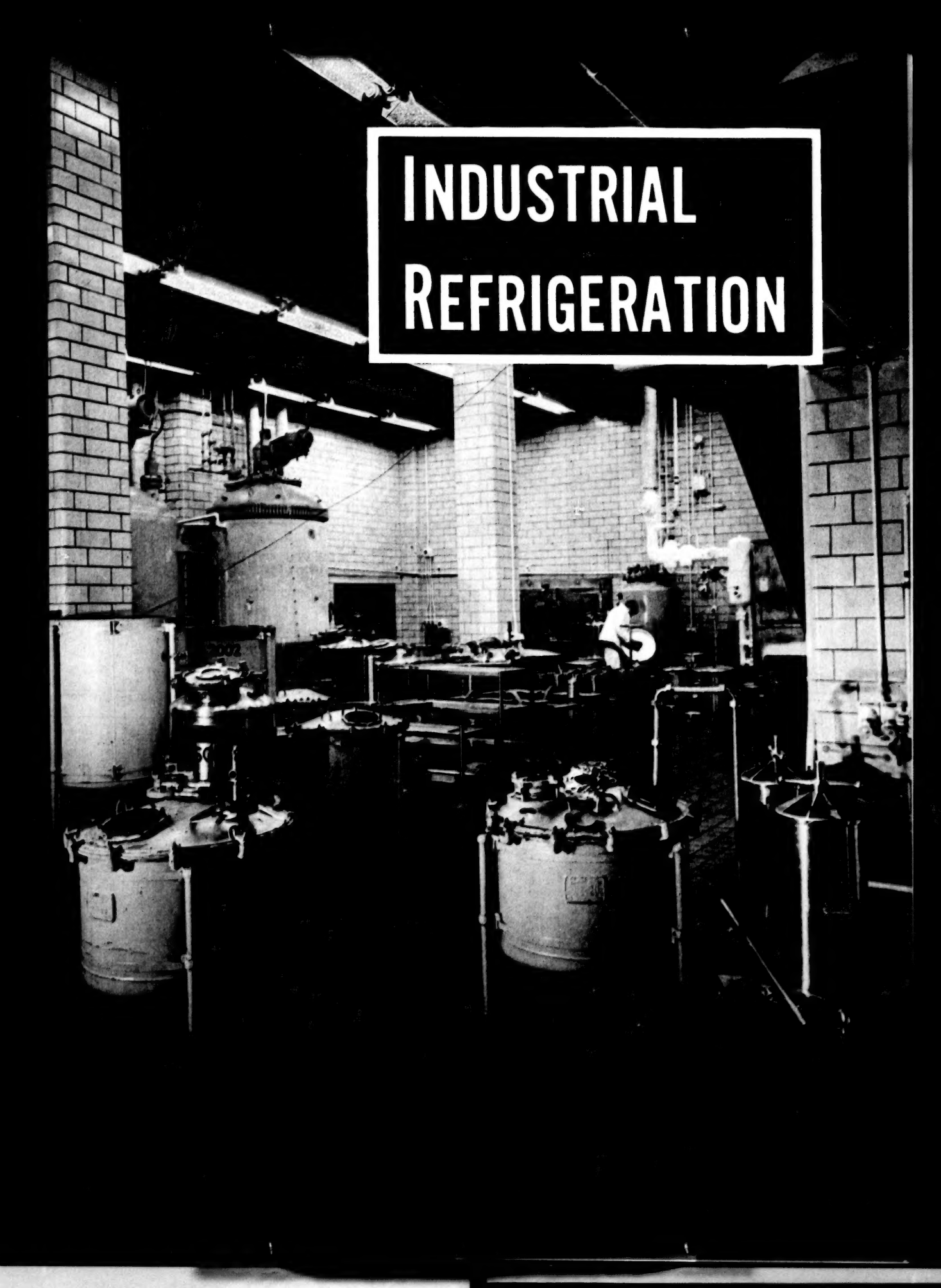
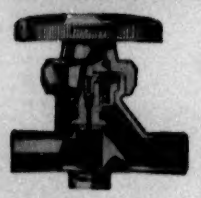

INDUSTRIAL
REFRIGERATION

HENRY LINE VALVES really give you something extra

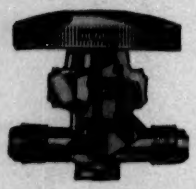
They give more dependable service because of advanced field-proven design and construction as well as patented features.

PACKLESS VALVES
FOR FREON
with Exclusive Balanced-Action



STANDARD TYPE

Ball check in balancing channel permits diaphragm inspection and replacement with valves under line pressure. Sizes, ¼" thru ⅝" flare; ¼" thru 1⅜" O.D. Solder, ¼" thru ½" F.P.T.



BLUE BANTAM TYPE

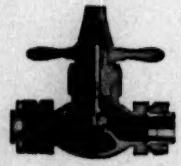
Same as standard Balanced-Action valve except that diaphragms cannot be inspected or replaced under line pressure. Size ¼" thru ⅝" flare and O.D. Solder.

PACKED VALVES
FOR FREON
Bronze-Wing Cap Type

Globe and angle types with solder connections, bolted bonnets, sizes ⅞" thru 4⅛" O.D.

SEMI-STEEL WING CAP TYPE

With bolted bonnets and square companion flanges. Furnished with brass tailpieces (O.D. Solder) 1⅜" thru 5⅛" or with steel tailpieces for welding to pipe, sizes 1¼" thru 5".



Also Globe and angle types with F.P.T. connections, sizes ½" thru 2".

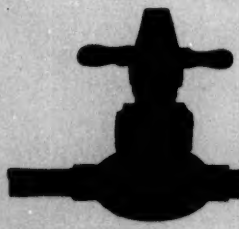
PACKED VALVES
FOR AMMONIA
Permanent-Mold Iron and Semi-Steel

Compact and strong with self-aligning stem disc. Sizes (F.P.T.), screw bonnet: ¼" thru 1", bolted bonnet 1¼" thru 2"—with flange connections 1¼" thru 5".

HENRY—Standard equipment by leading Manufacturers, Army, Navy, Coast Guard and Maritime Commission • Stocked by Leading Jobbers

WRITE FOR CATALOGS

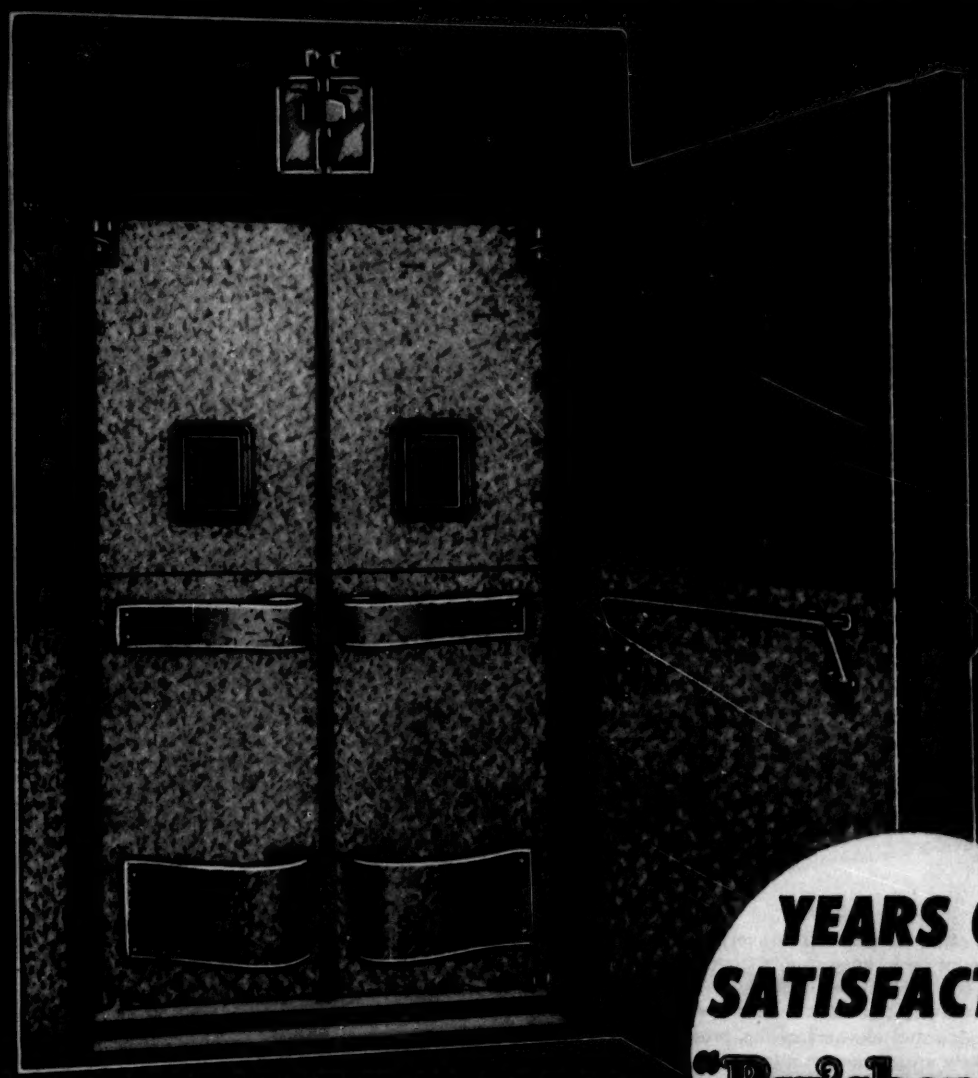
HENRY VALVE CO.



HENRY VALVE CO. CONTROLLING FLOW

Valves—Driers—Strainers—Control Devices and Accessories for Refrigeration, Air Conditioning and Industrial Applications

MELROSE PARK, ILL. (CHICAGO SUBURB)
CABLE: HEVALCO, MELROSE PARK, ILLINOIS



VESTIBULE TYPE TRACK DOOR

WHY "BUTCHER BOY" DOORS ARE THE FINEST REFRIGERATOR DOORS BUILT!

These Exclusive Features Furnished At No Extra Cost

DOOR STRUCTURE

HARDWARE

APPEARANCE

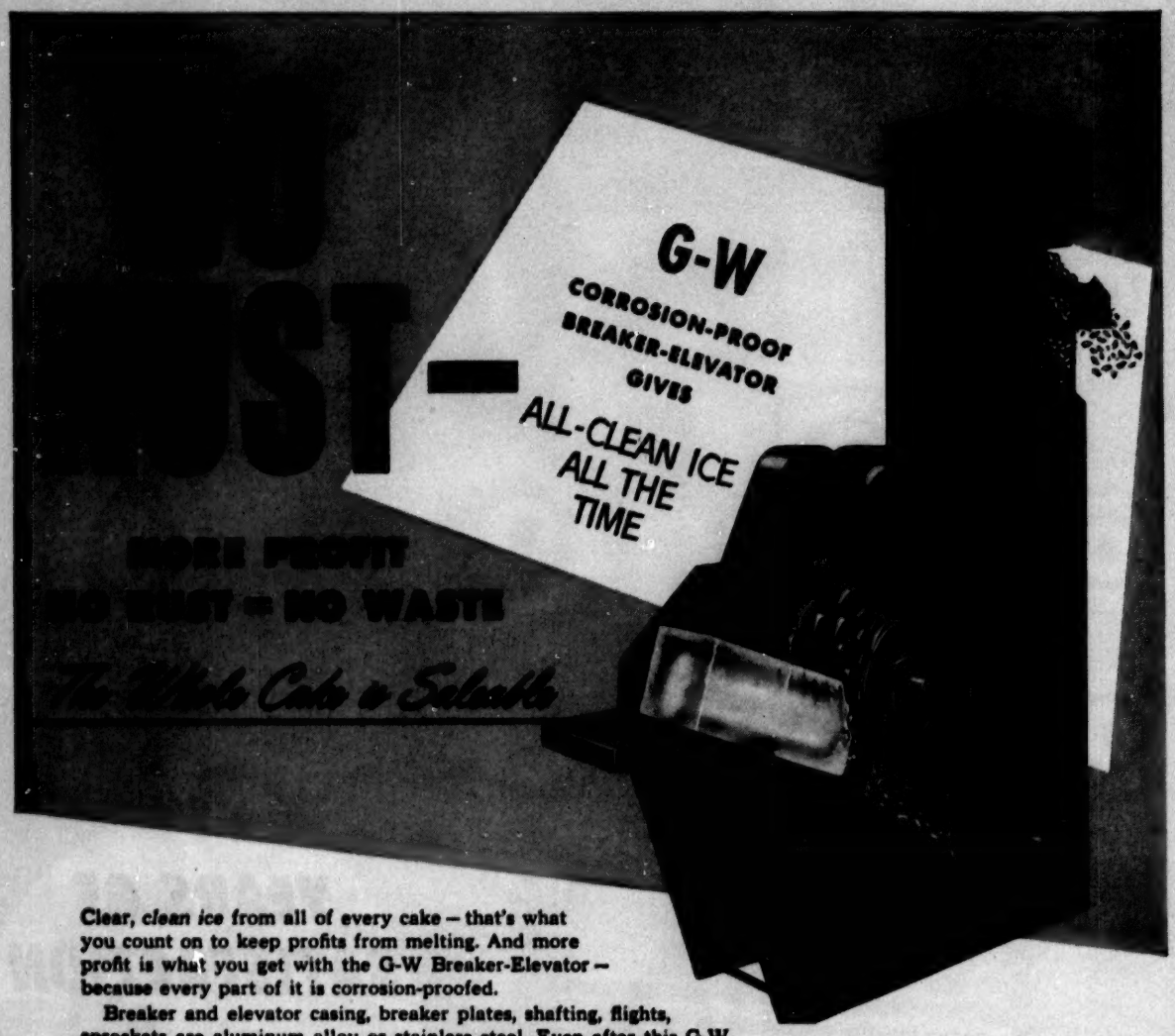
YEARS OF SATISFACTION

"Butcher Boy"

Quality Since 1885

When a Man Thinks Twice ...He Makes Comparisons

BUTCHER BOY REFRIGERATOR DOOR CO. HARVARD ILLINOIS



Clear, *clean ice* from all of every cake – that's what you count on to keep profits from melting. And more profit is what you get with the G-W Breaker-Elevator – because every part of it is corrosion-proofed.

Breaker and elevator casing, breaker plates, shafting, flights, sprockets are aluminum alloy or stainless steel. Even after this G-W Breaker has been standing idle, ice particles emerge rust-free and usable.

Corrosion-proofing isn't the only feature of the G-W Breaker-Elevator that was planned with your profit in mind. Snow ice and fines are reduced to a minimum because the *curved picks* strike the cake at right angles, imitating the slicing feed action of hand shaving. Particles are passed without additional crushing through the *comb plate* because the *breaker drum* is ribbed. Flow is steady, discharge is even because drop is minimized and *elevator flights* are close-spaced. A single motor drives both breaker and elevator.

Stop profit-loss where it can be biggest – in your ice breaker. Any G-W representative can tell you about this new profit-building, corrosion-proof breaker, and recommend a unit size to fit your exact needs.

GIFFORD-WOOD CO.

Since 1814
Hudson, N. Y.

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Pacific Coast Representative: WESTERN ICE EQUIPMENT CO., 420 Market St., San Francisco 11, Calif.

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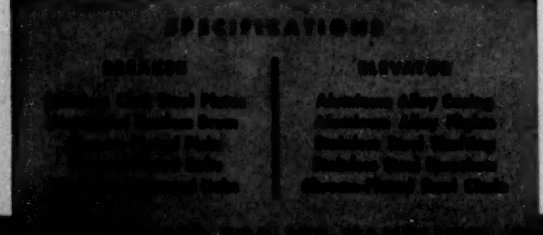

LETTERS

(Letters to the editor are welcome from readers of INDUSTRIAL REFRIGERATION on any subject of general interest.)

Good Coverage of Large Warehouse

Chicago, Ill.

THE February issue of Industrial Refrigeration arrived this morning. Thank you very much for the good coverage you gave the Calumet Industrial District project. You got a very good picture also, from the print we sent you. While this first warehouse will have temperature-maintained space of only 70 and 45 degrees, it is true that, upon completion, the District will certainly have the largest refrigerated warehouse space in the world.

THELMA A. FAARISON
Calumet Industrial District Co.

More On Insurance Article

Kansas City, Mo.

I have just had the pleasure of seeing your February, 1955 issue of INDUSTRIAL REFRIGERATION and certainly appreciate the way in which you have presented my article on "Are You Covered." I sincerely hope that the information helps members of the refrigeration industry secure the types and kinds of insurance they need at the lowest possible cost consistent with sound protection. Thanks for giving us an opportunity to present this information through the medium of INDUSTRIAL REFRIGERATION.

MAX K. DOEHLER, JR.
Bruce Dodson & Company

Northland Center Story Concise and Accurate

MR. CARPENTER has asked me to thank you and your staff for the very fine article on Northland Center that appeared in January issue of Industrial Refrigeration. Much inaccurate copy has appeared concerning our project and therefore we appreciated very much the opportunity you afforded us by mailing us the manuscript for slight corrections. Thank you again for telling our story in a concise and accurate manner.

ROBERT C. CRISLER
PUBLICITY MANAGER
NORTHLAND CENTER INC.

Industrial Refrigeration

formerly **ICE AND REFRIGERATION**
Now in its 64th Year of Publication
J. F. NICKERSON, FOUNDER

Vol. 128 April, 1955 Number 4

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The Cover:

The blood fractionation room in Armour Pharmaceutical Center at Kankakee, Illinois. Here water and alcohol centrifuging are performed at temperature of 23 F. This room, with an area of 3600 square feet, contains refrigerated centrifuges chilled by alcohol, which is chilled in a shell and tube heat exchanger by ammonia at low suction pressure. See story starting on page 15.

Published Monthly by NICKERSON & COLLINS CO.
General Offices: 433 N. Waller Ave., Chicago 44, Ill. Telephones: AUstin 7-1303-04-05

H. T. McDERMOTT, EDITOR AND PUBLISHER — E. R. CURRY, MANAGING EDITOR — J. R. KELAHAN, TECHNICAL EDITOR — H. D. BUSBY, ASSOCIATE EDITOR

ADVERTISING—O. RHODIUS ELOFSON, DIRECTOR — EDW. DAVIESON, Advertising Representative

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INDUSTRIAL REFRIGERATION, Vol. 128 No. 4 Published monthly at 433 N. Waller Ave., Chicago, Ill., U.S.A., by Nickerson & Collins Co. Yearly subscription in the U. S., $2.00 per year; other countries, $5.00. Single copies, 25 cents.

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Industrial Refrigeration is indexed regularly by Engineering Index, Inc., and is microfilmed for library use by University Microfilms.

What's New

MACHINERY
APPLIANCES • PROCESSES

New Portable Hydraulic Bending Tool for Pipe

THE first portable hydraulic bending tool for bending pipe as well as tubing, with one and the same bender, is brought on the market by Tal Bender, Inc., of Milwaukee 2, Wisconsin. The invention, for which a patent is pending, concerns a

Hydraulic Bending Tool used as pipe bender

hydraulic bending tool for all purposes. They equip now their hydraulic One Shot Pipe Benders with a newly developed frame, which enables the contractors to bend pipe, rigid conduit, as well as thin-wall conduit(EMT), hard and soft copper, aluminum and steel and any other tubing in 90° and 180°.

Hydraulic Bending Tool used as tube bender

This increases greatly the versatility of the benders, and according to the manufacturers, reduces considerably the purchase price of the tube bender, as well as the combination tube and pipe benders. Especially for use on the job, these benders will be of great advantage, when pipe and tubing both have to be bent on the spot, thus eliminating the inconvenience of having different kinds of benders on the job. The manufacturer advises also that for a small charge, they are in a position to convert existing equipment.

Device Detects Moisture in Refrigeration Systems

A NEW moisture control system for refrigeration equipment has been developed by Ansul Chemical Company, Marinette, Wisconsin. The Ansul Dry-Eye System performs the dual job of indicating when moisture is present in a refrigeration system and then removing it. Now it will be possible for refrigeration maintenance men or owners to see and analyze at a glance the approximate moisture content of the refrigerant without shutting down the system.

The leak-proof window of the unit contains a special indicating element which changes color depending on the moisture content of the refrigerant. When the window shows blue, the refrigeration equipment is dry. If it's pink, then moisture is present.

The new device has far-reaching implications for the entire industry because acid and sludge the two most frequent causes of refrigeration system breakdown invariably result from the presence of moisture. By spotting moisture trouble in its earliest stages it will be possible to avoid serious difficulties later.

To correct these troublesome conditions, the T-Flo Dry-Eye cartridge cleans the system by removing moisture or, if acid and sludge have already formed when the cartridge is installed, it will remove these dangerous elements, too. When the cartridge has done its job, it can easily be removed without breaking the refrigerant line, and a new cartridge screwed onto the indicator fitting.

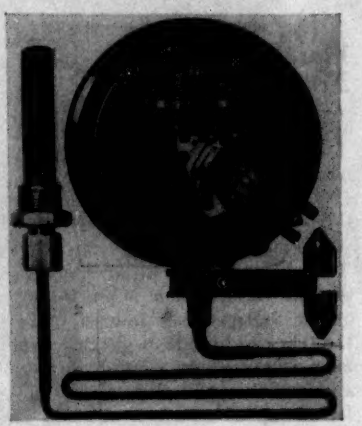
New Ansul Dry-Eye system which indicates when moisture is present in a refrigerating system and also removes it. The leak-proof window on top of the unit contains a special indicating element which changes color, depending on the moisture content of the refrigerant.

The Dry-Eye System is expected to be an important boon to refrigeration service contractors and engineers, as it will greatly simplify and reduce the expense of servicing installations.

The cartridge is available in sizes of 8, 12, 20 and 30 cubic inches. The indicator fitting is available in ¼ in. ⅜ in. and ½ in. flare sizes. The cartridge and indicator are sold as one unit, in any combinations of the above sizes. All cartridges are interchangeable on all fittings.

Mercoid Two-Stage Temperature Control

A TWO-STAGE temperature control which provides the advantage of staged operation from a single actuating bourdon tube has been introduced by the Mercoid Corp., Chicago. The control incorporates two independently adjustable magnetic mercury switches which provide for successive stage operation or high-low operation. A few examples are:



The New Mercoid two-stage temperature control

To close one alarm circuit at high temperature and another at low temperature setting. Both circuits remain open between the high and low temperature operating points of the two switches.

As an electrical interlock to open one circuit as temperature rises above, and the second circuit as temperature drops below the set operating points.

To provide two-stage control by opening one circuit on a rise in temperature and a second circuit on a further rise in temperature.

The controls can be furnished in 11 different operating ranges. They are equipped with external adjustments and a visible calibrated dial. The switches are sealed magnetic mercury types.

The standard steel case (for general purpose) conforms to NEMA 1. Weatherproof cases (NEMA 1A, 2, 3, 4) and Explosion-proof cases (Class 1, Group D, or Class 2, Group E, F, & G) are available.

Sign Up SPORLAN'S CHAMPIONSHIP TEAM for PEAK PERFORMANCE throughout your entire AIR CONDITIONING SEASON

because

like any Top Team
SPORLAN
offers you
PEAK PERFORMANCE
at *Every* Position...
...TIONING FIELD

Position 1

The Catch-All is the perfect filter-drier, assuring you clean, dry, acid-free, sludge-free refrigerant!

Position 2

Nothing can touch the Peak Performance of Sporlan's Solenoid Valves. They're tight closing, their coils are layer wound and so well insulated, they defy electrical failure!

Position 3

No hunting here, thanks to Sporlan's Thermostatic Expansion Valves with Flow Master elements. You can be sure of Peak Performance without ever worrying again about alternately flooded and starved evaporators!

Position 4

Sporlan Peak Performance Distributors have a perfectly designed nozzle and conical button to assure uniform distribution to all circuits.

SPORLAN

So Remember, when you're lining up your positions for a championship air conditioning team... Buy Sporlan Right-Down-The-Line and get Peak Performance throughout your entire air conditioning season.

SPORLAN VALVE COMPANY
7525 SUSSEX AVENUE ST. LOUIS 17, MISSOURI
Export Department: 89 Broad Street, New York 4, New York

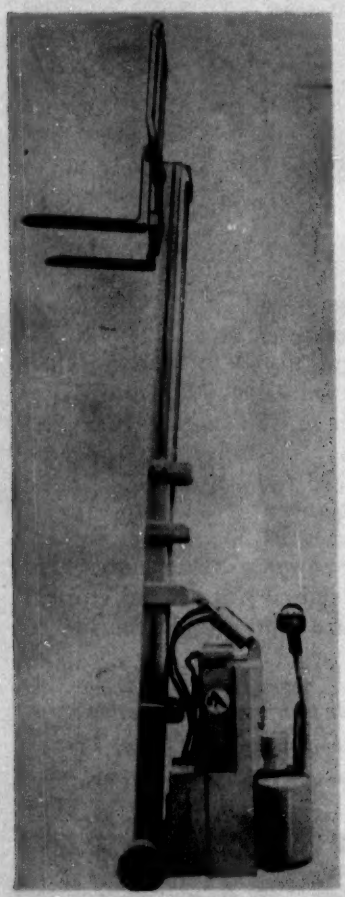
New Counterbalanced Tilting Lift Truck

AN addition to its line of electric high lift walkies—the 1000 lb. capacity telescopic tilting Counterbalanced JackStacker, is announced by Lewis-Shepard Products Inc., Watertown, Mass.

The overall length of the truck, with 24 inch long forks, is only 63¾ inches—making it the shortest counterbalanced "walkie" of its kind on the market. It is not only the shortest, but the only truck of its type having both telescopic and tilting features. The new short JackStacker has a capacity of 1000 lbs. at a 24 inch load length. The collapsed height is 83 inches with a fork elevation of 130 inches and a wheel base of 25 inches. The tilt is 5° in and 0° out and chisel forks 1 inch thick are standard.

Because of its compact design, the truck operates in aisles only 64 inches wide with 24 inch long loads. The controls are located in the handle head. The brake can be released and power applied with the handle in the vertical position, thereby saving further in aisle space.

Factory-sealed bearings are used throughout the truck; there is no need for periodic lubrication. The JackStacker is ideal for warehousing and similar operations where high stacking is required.



New Counterbalanced JackStacker

New Pipemaster Vise

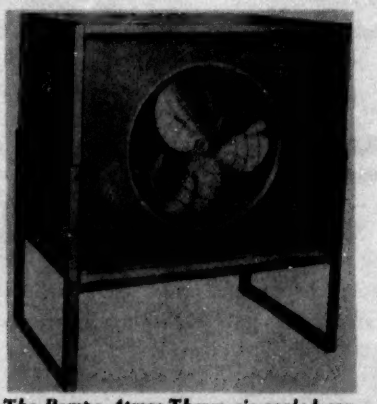
A NEW Pipemaster Vise which automatically adjusts on pipe from ⅛ to 2-½ inches, and clamps on it with less than one turn of the screw is announced by Erie Tool Works, Erie, Pa. Another feature is a 3-way, long, tool-steel top jaw with milled teeth which gives triple jaw life. The long, tool-steel bottom jaws are reversible, too. Exclusive, too, are the vertical benders on both sides of the vise base — you can attach the vise to any corner of your bench and see the bend. A spring under the self-locking hook keeps the top jaw housing tight and level.

The New Pipemaster Vise

New Condenser Eliminates Need for Water

TO MEET the problem of excessive use of water in air conditioning systems, a new air-cooled condenser called the Atmos-Therm has been introduced by the Rempe Company, Chicago, Ill. This unit changes the hot gas to a liquid ready for use at the expansion valve. No water is used, cooling is done by air. The unit is fin coil with copper tubes and aluminum fins, with weather-proof casing of heavy gauge steel.

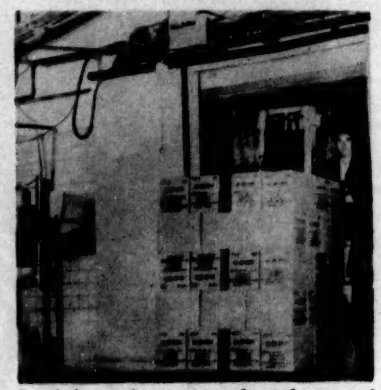
The Atmos-Therm is available in four models: 2 ton, 3 ton, 5 ton and 7½ ton. The three ton unit illustrated is 53 inches high including 15 inch stand.



The Rempe Atmos-Therm air cooled condenser, three-ton unit.

Automatic Doors For Refrigerated Rooms

A NEW electrically-operated automatic refrigerator door, especially designed for all types of cold storage, has been announced by Clark Door Company, Newark, New Jersey. This latest addition to the company's line of Prest-O-Matic Industrial Door Units is said to be suited for frozen food lockers and refrigerated compartments. Fiberglas insulation of recommended thickness is used in the door sections. Temperature interchange is further minimized by specially designed rubber sealing gaskets that provide tight closure.



Loaded truck passing through opened refrigerator door

Although all standard types of control are available, the manufacturer usually recommends approach pull cord or push buttons which do not require the truck operator to leave his vehicle or even stop to actuate the doors.

Prest-O-Matic freezer doors are manufactured as complete packaged units, including motor operator, frame, insulated door sections, all hardware and controls.

Resin Corrosion Protection Introduced by Pennsalt

A NEW resin coating "Thick-Coat", developed by the Corrosion Engineering Dept., Pennsylvania Salt Manufacturing Company, and used with special Pennsalt high bond strength primers to insure adhesion, provides a durable protective coating for new or corroded metal; concrete and wood equipment; and structures or surfaces exposed to fumes, corrosive chemical laden atmospheres, or spillage of corrosive chemicals of acid, alkaline or neutral nature.

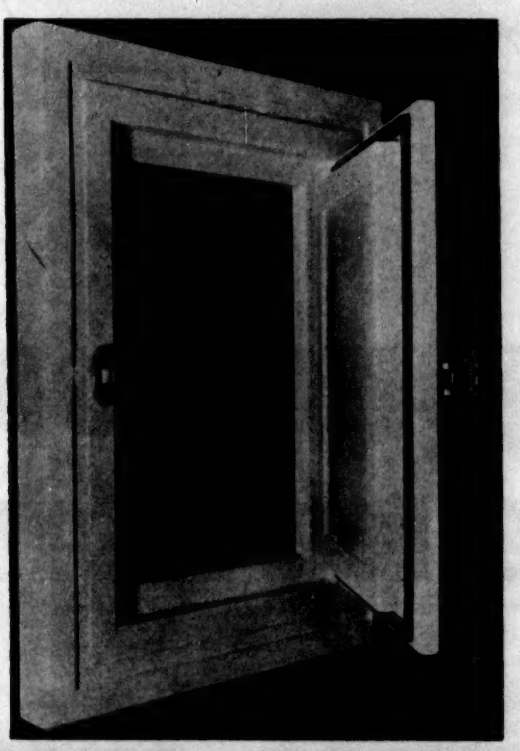
"Thick-Coat", according to the manufacturer, has excellent flow qualities and is applied like regular maintenance paint by brush, roller or spray as it comes from the can. In a three coat system — one primer and two top coats — it will build to a minimum of six mils dry film thickness. Containing over 60 percent solids by weight. "Thick-Coat" is claimed to assure long lasting protection on edges, prominences and crevices and plain surfaces.

This resin material is regularly offered in white, green, slate gray and black. Other colors are available on special order.

Hasko-Struct Insulated Panels

COMMERCIAL refrigerator manufacturers and refrigerator door builders are offered laminated sandwich panels of Fiberglas cloth polyester laminate and light-weight self-extinguishing Styrofoam insulation, for sectional boxes and cold storage doors, by the Haskelite Manufacturing Co., Grand Rapids, Mich. Known as "Hasko-Struct", panels of .030 or .060-in. veneer, laminated to the insulation on one or both sides, are available in 4 ft. widths, 8, 10 and 12 ft. lengths, and 1, 2, 4 and 6-in. thicknesses.

"Hasko-Mold" shapes (strips, angles, channels, and jambs), which like the panels can be cut with hand or power tools, are available for construction in much the same sizes, gauges, and uses as the common steel shapes employed in modern window, sash, and door manufacturing. Plastic bonding material ("Hasko-Bond") can be supplied to fabricators. A copyrighted catalog is available, listing products available, typical assembly details, and physical properties determined by tests.



Typical reach-in refrigerator door and frame fabricated of "Hasko-Struct" and "Hasko-Mold". Below a sample fabrication available from manufacturer.

Advantages of "Hasko-Struct", according to the manufacturer, are: structural strength combined with light weight makes possible savings in materials and handling costs; low thermal conductivity and constant insulating value insures long service life with reduced operating and maintenance costs; service life is also improved by the resistance to moisture, vermin, impact, and deformation; elimination of corrosion and rot to the economy and serviceability of these panels; dimensional control assures uniformity of tolerances.

Taylor specializes in taking TEMPERATURES

WHETHER you want to control and record them, simply record them, or just have a clear, accurate indication of what they are, there's a Taylor instrument that will do the job superlatively well. Help you cut costs; give you new efficiency. Here are just a few of the wide selection. A postcard will bring you *Catalog 300*, with detailed information, or call your Taylor Field Engineer. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.*

TAYLOR FULSCOPE* CONTROLLER

For *tanks, brine lines, compressors*, etc. Probably the most versatile instrument made for temperature, pressure, flow and liquid level control. Easily adaptable to any operating conditions.

TAYLOR RECORDING THERMOMETER

For *brine tanks, brine and ammonia lines, bunker rooms*, or any process in refrigeration where temperature record is required. Available to record in one, two or three different temperatures.

TAYLOR INDUSTRIAL THERMOMETER

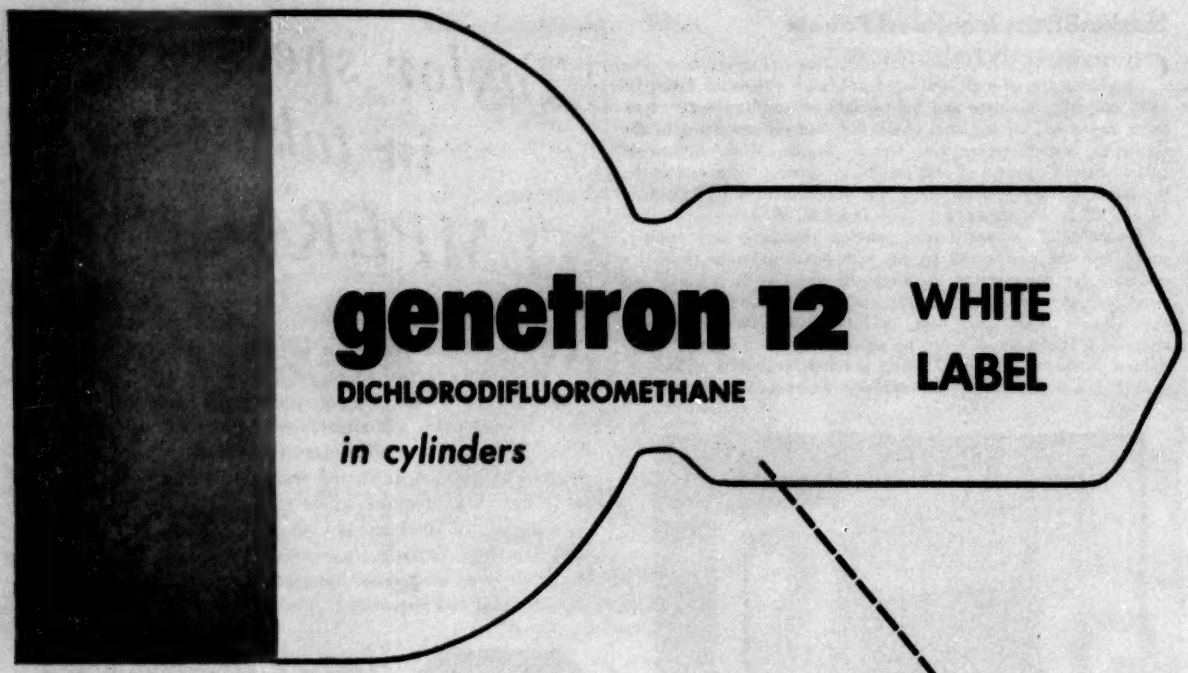
For installation in insulated lines. Sturdy, one-piece, shallow case for wide angle of vision. Triple lens BINOC* tubing and bold, contrasting scale make this the easiest to read of all industrial thermometers. Straight or 90 angle stems. Many other types, ranges and angles.

NEW 6" DIAL INDICATOR

For temperature or pressure applications, where periodic reference only is required. Mercury, gas, organic liquid or vapor actuation, as desired. Variety of ranges. All new movement minimizes linkage error—gives greater accuracy throughout span. Fume and moisture proof case can be face or flush mounted.

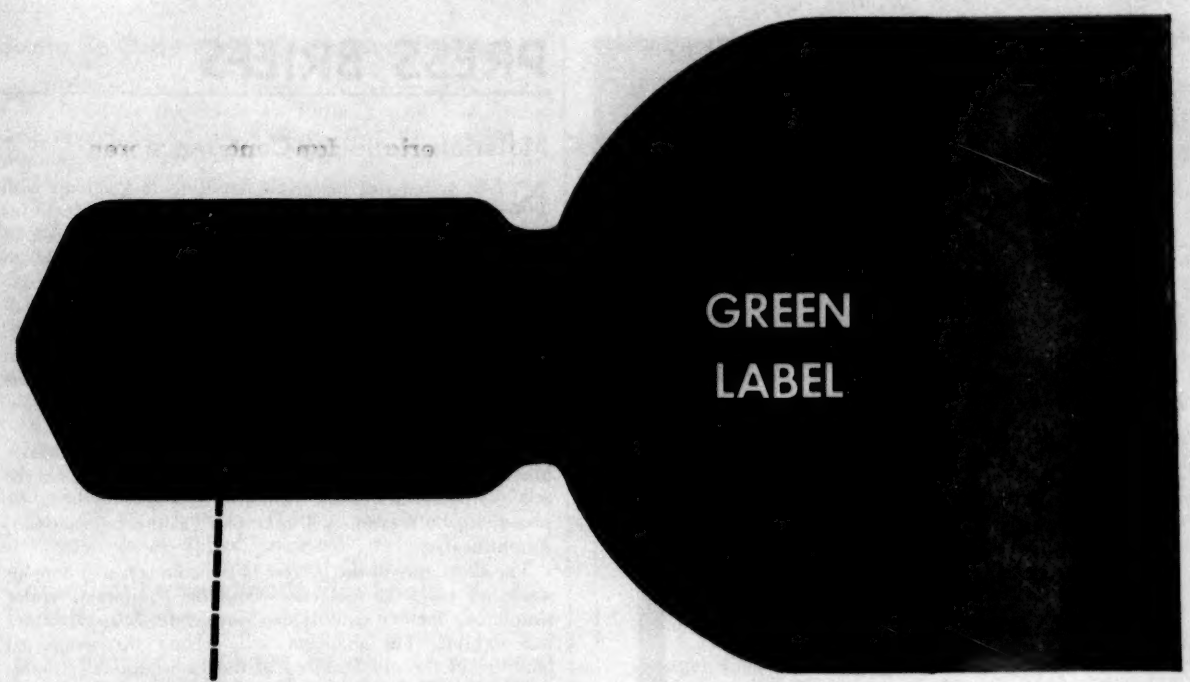
*Reg. U. S. Pat. Off.

Taylor Instruments
MEAN ACCURACY FIRST



YES... genetron®
ARE COLOR-CODED

genetron...
Super-Dry
Refrigerants



Super-Dry Refrigerants FOR YOUR CONVENIENCE!

It's always easy to know the contents of "Genetron" refrigerant cylinders or drums. That's because the top of each container is clearly marked with a distinctive color to identify which refrigerant it contains . . . and the labels are printed in matching colors to provide a double-check for you.

So, don't worry about learning long chemical names or confusing formulae. Just remember this: *In refrigerants, the name "Genetron" always identifies General Chemical's great line of "super-dry" refrigerants.*

And, the label color code always means:

- **WHITE LABEL** —DICHLORODIFLUOROMETHANE
- **GREEN LABEL** —MONOCHLORODIFLUOROMETHANE
- **ORANGE LABEL**—TRICHLOROMONOFLUOROMETHANE

For speed, simplicity, convenience, buy . . . order . . . specify "Genetron" Refrigerants by color!

GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

Offices: Albany • Atlanta • Baltimore • Birmingham • Boston • Bridgeport • Buffalo Charlotte • Chicago • Cleveland • Denver • Detroit • Greenville (Miss.) • Houston Jacksonville • Kalamazoo • Los Angeles • Minneapolis • New York • Philadelphia Pittsburgh • Providence • San Francisco • Seattle • St. Louis • Yakima (Wash.) In Wisconsin: General Chemical Company, Inc., Milwaukee

In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

GC Allied Chemical

America's Foremost Producer of Fluorine Chemicals

HOWE COMPRESSOR INSTALLATION showing 4 models G-20-6½", 2 models GS-20-6½" Boosters, and 1 model G-15-5½".

NEW 1955 IMPROVED

HOWE

REFRIGERATION

EQUIPMENT

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PRESS BRIEFS

Materials Handling Conference

NEW systems of materials handling to keep up with the growth of automation in the nation's factories will highlight the three-day conference to be presented by the American Material Handling Society in Chicago in May. Materials handling, the science of moving raw materials and finished products with a minimum of human labor, is one of the principal factors in automation.

Problems of plants which must continue production in out-moded, multi-story buildings, as well as in those where plant layout is of the latest design, will be considered.

The conference will run during the first three days, May 16-18, of the week of May 16-20 during which the 6th National Materials Handling Exposition will be presented. Both events will take place at the International Amphitheatre.

The show, one of the largest in the country, will demonstrate all types of materials handling equipment under simulated factory conditions. More than 200 companies will exhibit. The displays will occupy the combined facilities of the old building of the International Amphitheatre and its newly-constructed addition.

Topics to be discussed at the conference will cover the wide range of cost reduction; effect of handling on production problems; receiving; warehousing; shipping; containers; palletization; storage patterns; loading and unloading facilities; purchase, leasing, replacement and maintenance policies; analysis of materials handling problems and its relationship to layout and production; water, rail and over-the-road carriers, and materials handling in the yard.

Butter Converted to Butter Oil

THE United States Dept. of Agriculture has announced the awarding of a contract to the Wisconsin Dried Egg Co., Manawa, Wis., for converting 900,000 pounds of Commodity Credit Corporation-owned butter to butter oil at 5.34 cents a pound of butter oil. The butter oil will be donated for human food use in India and Pakistan. Transportation costs were taken into consideration in making the award.

Including the contract award announced, approximately 46.6 million pounds of Commodity Credit Corporation-owned butter have either been converted or scheduled for conversion to butter oil, mostly for donation for foreign welfare feeding. In some areas of the world, butter oil is used for food instead of butter. In converting butter to butter oil, the butter is first melted. The fat is then separated from the water or curd. The fat or oil at room temperature is in a semi-solid state.

Grape Association Plans New Storage

THE KEYSTONE Cooperative Grape Association, North East, Pa. plans to spend $350,000 on an expansion program that will begin this spring. The project, which includes a large cold storage and sharp freezer room, is to be completed for use next harvest time.

According to C. W. Garfield, cooperative president, the new cold storage, to be started as soon as the frost is out of the ground, will be made of poured concrete and concrete block with structural steel frame and precast slab roofs, similar to the present buildings which have proved satisfactory.

Santa Fe Orders 140 Mechanical Reefers

AN ORDER for 140 freight car refrigeration units, placed by the Santa Fe Railway with The Trane Company of La Crosse, indicates that the number of mechanical "reefers" on U. S. Railroads will virtually double during 1955.

This order, one of the largest of its kind ever placed by a single railroad, raises to 580 the number of mechanically refrigerated cars being built by railroads, railway-owned private car lines, or private shippers. A total of 675 such cars were already in service on February 1, 1955.

Santa Fe will build the 140 cars, along with 10 other mechanical "reefers," at its West Wichita, Kansas, shops during 1955. The new program will bring to 180 the road's total of mechanical refrigerator cars.

Intended particularly for frozen foods, the new equipment will provide temperatures of zero to 10 below for the 50-foot-long, super-insulated cars, which contain 3,054 cubic feet of space — 55 per cent more than Santa Fe's conventional 40-foot ice-cooled "reefers."

Canadian Frozen Foods Plant Sold To U.S. Investors

THE purchase of Birds Eye Foods Ltd. of Canada from Unilever, Ltd., of London has been announced by a group headed by Milton S. Jennings, president of National Almond Products Corporation, New York, and Hugh Paton, president of Paton Corporation, Ltd., of Toronto.

Mr. Paton said operation of the company will be primarily Canadian, with American "know-how" in the frozen foods field added. The new management, he said, plans to establish frozen food processing plants in the Maritimes, Ontario and British Columbia.

At present, he added, 65 percent of frozen food products sold in Canada are imported from the United States, and it is planned to increase greatly the share supplied by Canadian producers.

New Citrus Packing Plant

THE American Fruit Growers Association plans to construct facilities at Placentia, Calif., to replace its Fullerton citrus packing plant destroyed by fire last December, it was announced by Robert Strain, manager. The company plans to build a refrigeration and storage section to be used for packing operations in conjunction with an existing warehouse located on Placentia-Yorba Road, near Kraemer Ave. Cost of the property and the proposed additional facilities will be about $300,000, Mr. Strain estimated.

Borden Acquires Des Moines Dairy

THE HI-LAN Dairy, Des Moines, Iowa has been acquired by the Borden Company, which will operate it as the Hi-Lan Dairy division. Hi-Lan processes and distributes milk and other dairy products in the Des Moines area. It has one plant and about 130 employees. Borden did not disclose whether it acquired the company through cash or exchange of stock.

Orange Distributors Build Cold Storage

A NEW cold storage plant is being erected at a cost of $38,800 for Mutual Orange Distributors, Fillmore, Calif. A plant is maintained in Fillmore by the large marketing organization under the management of Herbert Blodget.

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Switch to CAT* power proves profitable

for Fisherman's Ice Co., Inc.

In 1951, Fisherman's Ice Co., Inc., bought a Cat D13000 Engine for its plant in Valona, Ga. In 1953, the company added a D311. Production of ice averages 14 tons a day during the season. Jack Amason, Manager, speaks from experience with a total of ten Caterpillar Diesels, including D318s in six shrimp boats. He reports: "We tried three other makes before using Caterpillar Diesels. Since 1946, we haven't had a Cat Engine that made us regret switching."

In the plant, the D13000 drives a 7 x 7 compressor and a 5 x 5 compressor and a booster eight months out of the year. The other four months the D311 powers the 5 x 5 compressor and the booster for the freezer and storage. On maintenance, it takes two men only 15 minutes once every ten days to lubricate the equipment and change the oil and filters. "Cost of running Cat Diesels is cheaper than any other engine we've used," Mr. Amason says. "It's also cheaper than electric power here. The difference between the two will pay for the D311 in three years, as our D13000 has operated 18,760 hours without down time."

Low-cost operation, simple maintenance, minimum down time and prompt parts service when needed add up to money-making production in any plant. You can count on *all four*, using Caterpillar Diesels. What's more, they deliver honest power—the power promised is the power you get, an important factor when selecting a unit. For steady production at low cost, switch to a rugged yellow engine or electric set, available up to 520 HP and 315 KW. For proof of performance, see your nearby Caterpillar Dealer.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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MODERN HEAVY-DUTY REFRIGERATION POWER

In the Spotlight

THE REFRIGERATION plant of the new Armour Pharmaceutical Center at Kankakee, Illinois has been adapted to different temperature requirements for varied products and processes. In this plant, refrigeration has a vital role in the production of insulin, serum albumin, gamma globulin and other biochemical compounds, and provides air conditioning for offices and other areas. For description and pictures see article starting on page 15.

SUPER-QUICK Freezing now available with the new 6,000 cubic foot blast freeze tunnel of the Philadelphia Warehousing and Storage Company, is said to be so rapid that foods retain more of their original freshness and appearance than is found in conventional commercial freezing. An Engineer for the project discusses the addition to the existing refrigerating plant and storage space, and new type oil-operated float valve used to maintain liquid refrigerant levels in article starting on page 19.

MELTING Ice Blocks were used recently by the Pacific Telephone Company at Olympia, Wash., to lower a telephone conduit too near the surface of a newly graded street. Complete success was achieved. For details see story and pictures page 24.

COSTS of Processing ice were drastically reduced with installation of modern equipment, as told by Thomas G. Carroll, Wichita, Kansas, at the National Ice Convention. A processing cost of $3.00 a ton was reduced to $1.92 and to two cents per small bag. He also gave detailed routine of the processing and packaging process. Additional details in article, page 26.

A SURVEY of the refrigerated warehousing industry shows a very optimistic picture of the 1955 business outlook. Reports from warehousemen, food processors, and others indicate an expected upturn in demand for storage space for the principal commodities offered for storage. In addition, new products coming to the fore will use an appreciable amount of space now, and also offer good prospects for the future. A summary of the returns from this survey is covered in the article starting on page 30.

NEW REFRIGERANTS — their derivations, characteristics, physical properties, and U. S. trade names — are discussed in an article by Guy R. King, author of "Basic Refrigeration", published by Nickerson & Collins Co. Mr. King's work is accompanied by molecular sketches, tables and charts, which facilitate better understanding of the halogenated hydrocarbon refrigerants. See article on page 34.

WAREHOUSEMEN are expecting a record crowd at the annual conventions to be held in Chicago, April 12-16. For their information, a full program of featured speakers, panel discussions, and an all industry session on costs have been arranged, along with the usual entertainment. The annual meeting of The Refrigeration Research Foundation will be held at the same place the day before the AWA Convention opens. See page 51.

OF 28 BILLION bottles of soft drinks sold in the United States last year, 40 percent were sold through ice-packed coolers. They were in service stations, concession stands and all types of places, packed in ice.

NEW IDEAS on cooling and freezing poultry and their impact on packaging were presented by two speakers at the Fact Finding Conference of the Institute of American Poultry Industries. Abstracts of these talks are given in the article on page 54.

THE WAGE-HOUR law is facing a number of drastic amendments by Congress. The viewpoint of the ice industry, which is similar to that of other industries, is reflected in a brief resume of the situation, page 24.

THE ANSWER to all packaging problems, according to Paul N. Fuselier, Container Division, The Flintkote Co., is getting the right case for the job to be done, using testing laboratories to assure proper specifications. About three centuries ago, he says, the Chinese devised probably the first paper packages for tea. In 1871, Albert L. Jones produced corrugated paper for bottles. In 1894, the first corrugated box was used as better protection for bottles. Paper fiber cases have been advancing rapidly and are one of five major U.S. industries at present.

FROZEN FOOD sales in supermarkets are expected to move up to ten percent of the total volume of sales of such stores by 1960.

Two More Join N & C Twenty-five Year Club

TWO employees of Nickerson & Collins Company, publishers of INDUSTRIAL REFRIGERATION were honored March 15 by presentation to each of a watch and a government bond. The occasion was their having completed twenty-five years employment with the company. The recipients were Vernon S. Smith, production manager; and Mrs. Evelyn E. Swanson, circulation manager. The presentation was made by H. T. McDermott, editor and publisher. This brings to a total of four who have been so honored, a similar presentation having been made to Mrs. Helen Smith, secretary-treasurer, and Edgar R. Curry, managing editor, in 1952.

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REFRIGERATION ENGINEERING COMPANY
MONTGOMERY • MINNESOTA

Refrigeration Plant Adapted to Serve Changing Processes and Products

W. F. STOECKER

THIS ARTICLE shows an example of the modern trend toward expanding use of refrigeration into new fields. The plant described here, specially designed for manufacturing pharmaceuticals, has a refrigerating capacity of several thousand tons serving the main system, special evaporators, and providing air conditioning for offices and other areas.

Front view of Armour Pharmaceutical Center, Kankakee, Illinois

ADAPTABILITY is the keynote in the design of a large refrigeration plant at the new Armour Pharmaceutical Center in Kankakee, Illinois. In a plant where both the products that are manufactured and the processes used may change from year to year, refrigeration and other plant services must be extremely versatile.

Refrigeration plays a vital role in the production of insulin, serum albumin which the Army uses for treatment of shock, gamma globulin and numerous other biochemical compounds. This plant of the Armour Laboratories, a division of Armour and Company, has a total refrigeration capacity of nearly one thousand tons. In addition, several hundred tons of compressor capacity serve special evaporators which are independent of the main system. The refrigeration system serves several cold rooms, supplies refrigeration for a number of processes and also provides air conditioning for the office and areas where pharmaceuticals are packaged.

Refrigeration System

The ammonia plant provides refrigeration at three different temperature levels : 34 F, high suction pressure system; 6 F, intermediate suction pressure; and, minus 35 F, low suction pressure system. The main compressor room contains three four-cylinder compressors, two two-cylinder compressors and one two-cylinder booster compressor. All of the compressors are manufactured by Frick Co. and are direct-driven at 360 rpm by synchronous motors.

The schematic diagram, Fig 1, shows the main pieces of equipment located in the compressor room. Suction gas from the low-pressure line returns from the plant through a desuperheater used as a trap to the booster compressor. The pressure of this low-temperature suction gas is about six inches of mercury, vacuum. The booster compressor discharges gas at about 20 psig to the intermediate desuperheater where it bubbles through liquid ammonia.

Suction gas at the intermediate pressure returns from the plant to the intermediate desuperheater where any entrained liquid drops out. In cooling the superheated discharge gas from the booster, some liquid in the desuperheater evaporates, but a float valve maintains the liquid level by feeding in some liquid from the receiver. The gas in the desuperheater is at the intermediate suction pressure and flows from the desuperheater into a header which runs to all of the compressors. By this arrangement any one or a combination of several compressors could pump the intermediate-pressure suction gas.

The suction gas from the water chiller, at the high pressure of 45 psig, enters a common header which serves all of the compressors also. Any compressor, except the booster, therefore, can pump either intermediate or high pressure suction gas.

Product and Methods Change Process Refrigeration Loads

In a plant such as Armour's, the load not only varies from season to season, but the entire refrigeration load structure may change when the plant begins manufacturing a new product or changes its method of manufacture. With any compressor able to handle either intermediate or high-pressure gas, heavier loads on one or the other systems can be absorbed readily by the compressors. The installed compressor capacity is adequately sized for present plant operations. Reserve capacity is also available for the future. The three different suction pressures allow a wide range of operating temperatures.

If the booster compressor is out of service for repairs or maintenance, one of the other compressors can pump the low-pressure suction gas in single-stage compression.

Four vertical condensers with parallel ammonia piping liquify the ammonia. The condensers, which are manufactured by Frick, are 48 inches in diameter and have tubes 14 feet long. A minor portion of the condensing water flows from the header between the pump and the condenser to the water jackets of the compressors, and from there back to the tower. The jacket of the booster is cooled with liquid ammonia from

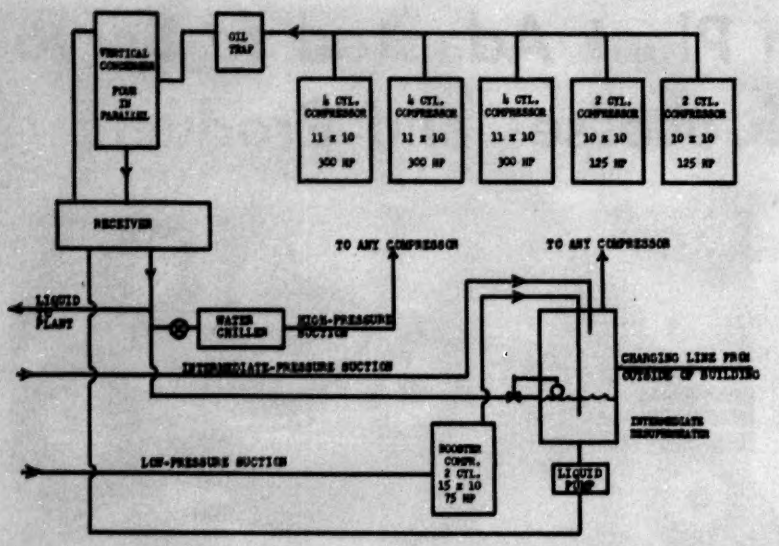

VERTICAL CONDENSER
FOUR IN PARALLEL
OIL TRAP
4 CYL. COMPRESSOR 11 x 10 300 HP
4 CYL. COMPRESSOR 11 x 10 300 HP
4 CYL. COMPRESSOR 11 x 10 300 HP
2 CYL. COMPRESSOR 10 x 10 125 HP
2 CYL. COMPRESSOR 10 x 10 125 HP
RECEIVER
TO ANY COMPRESSOR
TO ANY COMPRESSOR
LIQUID TO PLANT
WATER CHILLER
HIGH-PRESSURE SUCTION
INTERMEDIATE-PRESSURE SUCTION
CHARGING LINE FROM OUTSIDE OF BUILDING
INTERMEDIATE DESUPERHEATER
LOW-PRESSURE SUCTION
BOOSTER COMPR. 2 CYL. 15 x 10 75 HP
LIQUID PUMP

Fig. 1 — Schematic Refrigeration System at Armour Pharmaceutical Center.

the receiver and the ammonia then empties into the intermediate desuperheater. A Frick purging system removes air from the condensers.

Liquid-Return Pump

Installed below the desuperheater is a liquid-ammonia pump which transfers liquid from the desuperheater to the receiver. If for some reason the liquid level should rise too high in the desuperheater, it may slop over into the compressor. To guard against this danger, the desuperheater is equipped with Mojonnier magnetic float switches at four different levels. The switches at the lower two levels open and close the liquid inlet valve, and are the only ones which function during normal operation. If the liquid reaches the level of the top float, the switch starts the liquid-ammonia pump. The pump draws liquid out of the desuperheater and forces it back into the receiver. When the liquid level in the desuperheater drops back to the level of the next highest magnetic switch, the pump shuts off.

The liquid return pump represents another example of the flexibility of the plant. A sudden increase in load on an evaporator may foam liquid out into the suction line and into the desuperheater. The compressors, however, are protected from liquid carry-over by the liquid pump.

For convenience, the charging connection for adding ammonia to the system is on the outside of the building. Charging can be done without ever unloading the drums of ammonia from the truck. The charging line runs into the desuperheater. When the liquid level rises to the point where the liquid-return pump switches on, the liquefied portion of the charge is forced directly into the receiver.

Water Chiller

The evaporator which chills water for air conditioning is the entire load of the high pressure suction gas system. The water chiller is a Frick shell-and-tube evaporator, 34 inches in diameter and 18 feet long. The offices and sterile areas demand about 150 tons of air conditioning. Two 25-hp pumps circulate 700 gpm of chilled water through the water-chiller and then to the many air-cooling coils in the plant. The float-controlled liquid valve on the water-chiller is equipped with a by-pass which permits using a hand expansion valve if necessary. A back-pressure regulator on the suction line keeps the evaporator pressure high enough to prevent freezing the water.

Cold Rooms

Large cold rooms, which are currently operated at 23, 32 and 45 F, require a sizeable portion of the refrigeration capacity of the plant. There are also some freezing rooms where the temperature hovers at about minus 10 to 15 F. The rooms are adaptable; any of these cold rooms could operate at temperatures appreciably different than those now being used.

As an example of service, one of the cold rooms, the 23 F room, has an area of 3600 square feet and is the scene of blood fractionation, which must be done at low temperatures. This room contains refrigerated centrifuges which are chilled by alcohol (see cover picture). Ammonia at the low suction pressure chills the alcohol in the shell and tube heat exchangers pictured in Fig. 2.

Niagara "No-Frost" systems chill the air in the cold rooms with the exception of the 45 F room. In the "No-Frost" system, an anti-freeze solution sprays over the evaporator coils and removes moisture before it forms as frost. The air being cooled passes over the coils and through the spray. The "No-Frost" system is complete with a remote concentrator which drives off the

Fig. 2 — Evaporators for chilling alcohol "brine" used as process refrigerant.

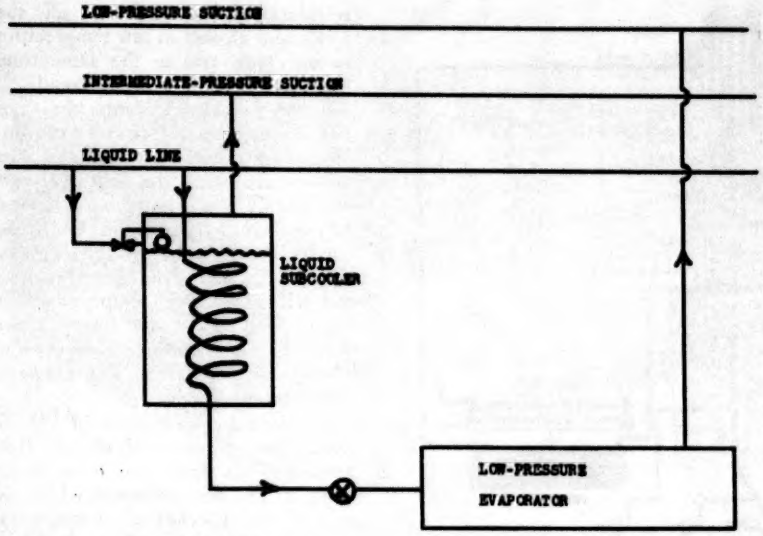


Fig. 3 — Liquid Subcooler Arrangement at Low-Temperature Evaporators.

water that was absorbed by the anti-freeze at the coil.

The 45 F room has no frost problem and here a blower coil cools the air. A small room which was designed for low temperature and equipped with a "No-Frost' system is now operating at 60 F. The "No-Frost" anti-freeze is not needed at the high temperature. Water rather than anti-freeze sprays over the coils and the heat-transfer rate is kept high.

Liquid Subcoolers

On many of the low-pressure evaporators, liquid subcoolers increase efficiency by pre-chilling the liquid which flows to the expansion valve. The diagram in Fig. 3 shows the arrangement of the subcooler. Ammonia in the shell of the subcooler evaporates at the intermediate suction pressure to cool the liquid in the coil of the subcooler. Ammonia at a relatively high pressure, therefore, does a portion of the cooling and results in a slight saving of power.

Air Conditioning System

The Armour plant has incorporated an elaborate air handling method into the heating and air conditioning system. In many areas of the plant, the sanitary standards are those of an operating room in a hospital. Air conditioning duct-work must therefore be cleaned quite frequently. Long runs of duct-work allow more area for dust to collect, and cleaning is costly because of inaccessibility. In the Armour plant, therefore, a complete and compact air conditioning system serves only one room. The system is located directly above the room it serves. Return air rises through grilles in the ceiling of the rooms through short ducts into the air conditioning system. The large room shown in Fig. 4 is typical of air conditioned work areas.

The air conditioning system consists of a fan, a fresh-air intake, filters, a cooling coil and a heating coil. The heating coil is also used for reheating the air for humidity control in the summer. The entire area above the room is a plenum chamber, and the air conditioning unit discharges its air directly into this plenum. The air in the plenum diffuses into the room through supply registers, located in the ceiling. Cleaning is easy since there is just a short return duct, and the floor of the plenum can be mopped with a bacteria-killing disinfectant.

Operating Practice

Many dollars can be saved by intelligent operation of a refrigeration plant, and the operating personnel at Armour are encouraged to be cost conscious. Operators have adequate instrumentation available so that they can readily check the performance of their equipment. All compressors are equipped with manually operated unloading valves which allow the operator to unload cylinders of the compressor as the load drops off. When the load on one of the four-cylinder compressors has dropped off sufficiently, one of the two-cylinder compressors is put into operation to replace the larger machine.

Head pressure runs up as high as 175 psig during the summer. During the winter, the head pressure is allowed to drop no lower than about 110 psig so that the evaporators—some of which are several hundred feet away from the compressor room—will be adequately fed with liquid.

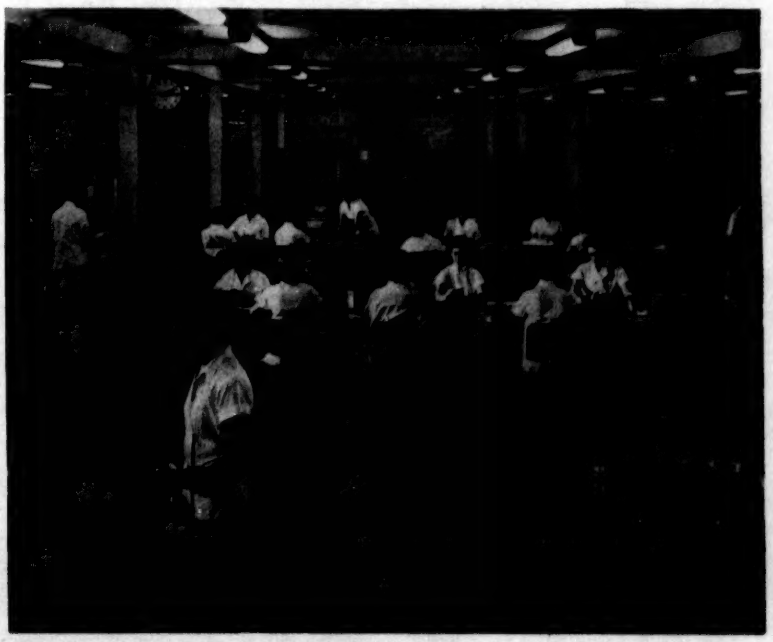


Fig. 4 — Armour employees package sealed containers in air conditioned laboratory. Typical installation uses sanitary construction furred space as plenum, discharging air through grille as pictured overhead.

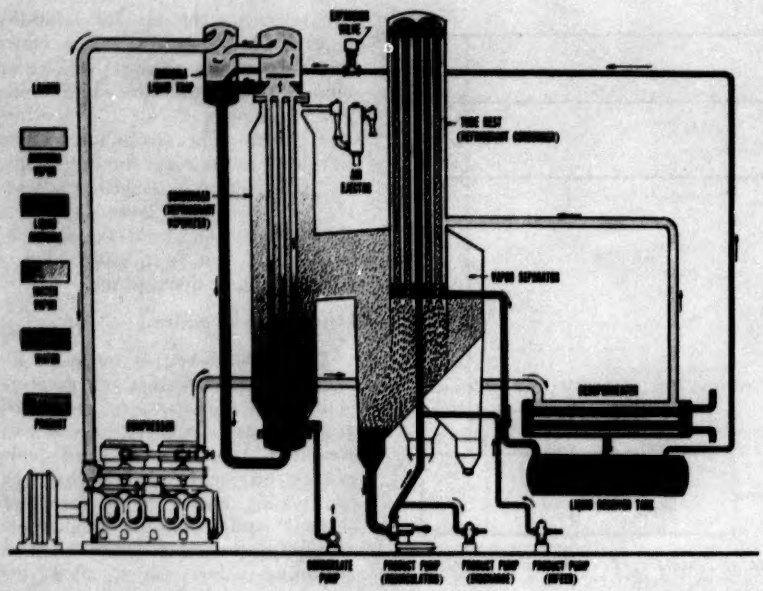


Fig. 5 — Flow diagram of Mojonnier "Lo-temp" evaporator systems used for separating insulin from its water and alcohol process solutions.

A Marley induced-draft tower cools the condenser-water used in the refrigeration system. Fifteen hundred gallons of water per minute spill through the tower. The water flows by gravity from the condenser to the tower and is pumped back to the condenser. During cold weather the fans are shut off and air movement through the cooling tower is provided by wind and by convection.

During the winter of 1953-54, a freeze-up of the air passages occurred which blocked the air flow. The weather moderated on that occasion before cooling tower capacity was completely lost. Should icing of the air passages occur again, the plant operators are planning to reverse the rotation of the fans so that air blows out the sides of the tower to thaw the ice.

Pump-Out Provisions

When engineers of Armour and Company planned the refrigeration plant, they were aware that many alterations would be necessary due to the continual changes in process manufacturing methods. One of the two-cylinder compressors was piped, therefore, so that it could be used to pump out any evaporator or condenser in the plant to allow modifications of the equipment. A pump-out line runs to all pieces of refrigeration equipment in the plant from the pump-out compressor. Complete evacuation of a condenser or evaporator with the low pressure suction system is not possible, since the refrigeration requirements of other low pressure evaporators must still be satisfied.

If an evaporator is to be worked on, for example, the operators will start pumping out the evaporator the day before work is to begin. When 30-in. vacuum is reached, the compressor is shut down. If the pressure in the system builds up after that, it is again pumped down to a 30-in. vacuum. This procedure is repeated until the vacuum can be maintained for three hours without the aid of the compressor. If there is any danger that ammonia is trapped somewhere in the evaporator, the compressor continues to run and discharges to the atmosphere outside the building while the men work on the evaporator.

There are no valves in the pump-out line between the piece of equipment and the compressor. Thus there is no danger that someone would shut off a valve in the pump-out line and the compressor would only evacuate the pipe, allowing workmen to unwittingly open a piece of equipment charged with ammonia.

Lo-Temp Evaporators

One of the final steps in the preparation of insulin is the removal of water and alcohol which is present from previous processing. If steam-heat were used to dry the insulin, the high temperature would damage it. If the water and alcohol were drawn off at low temperature and pressure with a steam-jet ejector, recovery of the alcohol would be difficult. A unique application of the refrigeration cycle drives off the water and alcohol at low temperature in one tank and at the same time recovers them in another vessel.

The separation systems are "Lo-Temp" evaporators, manufactured by Mojonnier Brothers Company. In these evaporators, the heat required to "boil-off" the water and alcohol is supplied by ammonia which is condensing in a refrigerated cycle. The water and alcohol are subsequently condensed by ammonia which is evaporating in the refrigeration cycle. This evaporator system is completely separate from the primary refrigeration system.

The schematic diagram in Fig. 5 shows the sequence of events. Hot ammonia gas from the compressor flows to the desuperheater which is to cool the superheated ammonia to its condensing temperature. Any liquid which should happen to condense in the desuperheater drops to the liquid receiver.

The desuperheated ammonia goes to the tube nest which serves as the refrigerant condenser. The ammonia liquifies in the tube nest and drains to the receiver. The liquid ammonia from the receiver flows through an expansion valve to the ammonia evaporator which is the alcohol and water condenser. Suction gas from the evaporator returns to the compressor.

The mixture of insulin, alcohol and water is pumped into the tube nest and trickles down the warm tubes, evaporating the water and alcohol. The concentrated insulin drops to the bottom of the tank, part of it to be recirculated and the rest leaving as the final product of the system. The mixture of water and alcohol vapor billows across to the refrigerant vaporizer where it condenses on the cold tubes and is then pumped to an alcohol reclaimer.

The low temperature is maintained in the evaporator by keeping the pressure low in the systems with a steam ejector. By maintaining a pressure of one-half inch of mercury in the evaporator, the "boiling" temperature is kept down to 60 F. A small amount of alcohol vapor is lost in the ejector, but the overall recovery of alcohol, which is re-used, is 95 percent.

Lo-Temp System Compressors

Conventional refrigeration compressors perform a key function in the operation of the "Lo-Temp" evaporators. Each system is served by its own compressor. The largest evap-

(continued on page 59)

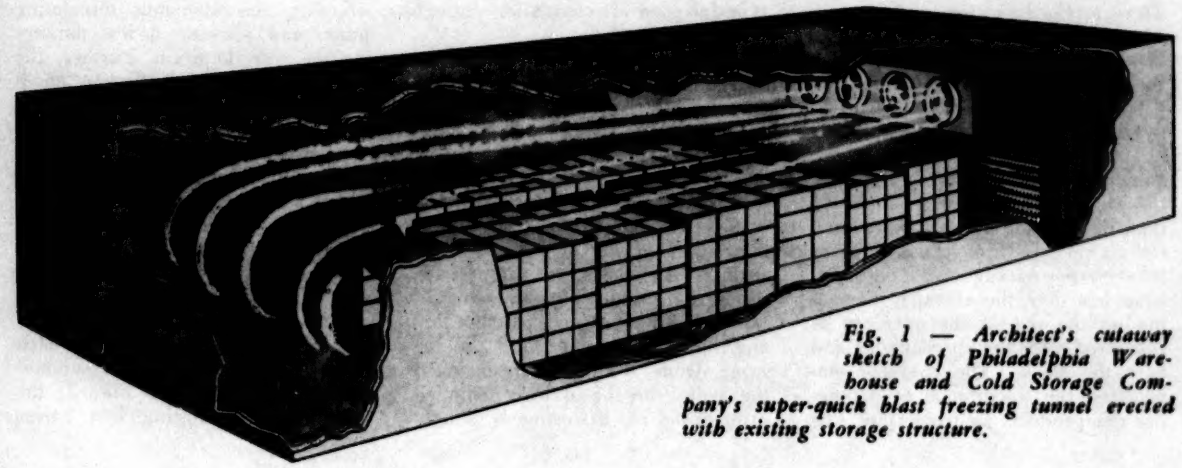


Fig. 1 — Architect's cutaway sketch of Philadelphia Warehouse and Cold Storage Company's super-quick blast freezing tunnel erected with existing storage structure.

Philadelphia Warehouse Adds

Fast Freezing Tunnel Processing

SIXTY degrees below zero is one of the arresting features with which Philadelphia Warehousing and Cold Storage Company headlines its advertising. As reported in "Press Briefs", November 1954, INDUSTRIAL REFRIGERATION, the company recently completed construction of a blast freeze tunnel, with innovations of lower temperature and faster air travel than are usually associated with this equipment.

"Super-quick freezing is almost unbelievably fast freezing", declares John W. Davis, president of the firm. "It captures and preserves flavor and texture at their very peak of freshness, and because this type of blast freezing penetrates so much more rapidly to the core of the product being frozen, it preserves more thoroughly than conventional methods. There is also a difference in appearance. For example, super-quick frozen chickens have the pinkish glow characteristic of fresh-killed poultry. Chickens frozen by slower methods usually lack this pinkish glow."

The firm's ten acres of plant and warehouse floor space is located at Delaware Avenue, Noble, Beach and Front Streets. The tunnel is being used by such companies as Campbell's Soups and Felin's Meats. Its facilities are available to food distributors, growers, raisers and processors for quick-freezing meats, poultry, fish and seafood, canned soup, and processed foods including Chinese and Italian specialties.

Tunnel Features Described

The tunnel (Fig. 1) is a long, narrow room with walls, ceiling and floor lined with 12 inches of cork insulation. The complete unit is located on one floor with a 20-foot ceiling and requires minimum maintenance. It contains approximately 6,000 cubic feet of space and can process an average of 100,000 pounds of food a day. A half-mile of piping forms the condenser coils within the tunnel.

The blast effect comes from a forced draft of four 36-inch fans, each powered by a 10-hp motor, which creates a steady gust with a maximum velocity of 15 miles per hour. As a result, according to the Philadelphia firm, the intense cold of 60 degrees below zero is forced into the food aided by palletized, scientifically spaced methods of stacking that permit immediate access of the tremendous flow of cold to all surfaces of every single package and product. The result is a highly desirable combination of 60 degrees below zero on the outer surface of the food and zero at the center, achieved in the shortest period of time recorded commercially.

Engineer Discusses Project

V. C. Patterson and Associates, Inc., York, Pa., designed and engineered this latest achievement in super-fast freezing. Interviewed by INDUSTRIAL REFRIGERATION staff, V. C. Patterson commented on the project:

"We were called in by the management of the Philadelphia Warehousing & Cold Storage Co., during the time the feasibility of a quick freezing system in connection with the cold storage operation was under consideration.

"Commissioned to make a study of the plant and plant facilities we set out to determine the following: Whether or not it was practical to use any of the existing cold storage rooms for quick freezing; cost to install fast low temperature facilities; cost to operate same; revenues to be expected from the freezing operation directly, and from additional storage indirectly. Our report was submitted in sufficient detail to enable the management to decide whether or not they would install a quick freezing system in their plant."

After carefully studying the consultant's report, Mr. Davis again called them in and asked for detailed drawings and specifications for the system designed and priced in the survey report. The room selected for the quick freezing tunnel was located on the ground floor adjacent to the loading dock and near an elevator. This space was also adjacent to the compressor room. The plan and elevation, are shown in Fig. 2.

A total 80,000 cfm of air is circulated by four vane-axial fans each direct-connected to a 10 hp motor.

The air velocity in the product space when the room is empty is 400 fpm. When the room is loaded so that the entire cross section of the product space is 60 percent filled the average velocity will be approximately 1000 fpm. According to Patterson, there is usually greater space over the product and sometimes under it, than through the product. Therefore, the air velocity through the openings between the packages will be somewhat less than the average, depending on the size of the openings as compared with the space under and over the stacks. The engineer emphasized the importance of arranging the products in freezers of this type for good air circulation through the stacks.

Defrosting Operations

Evaporators are 1¼ inch spiral fin coils with 2.67 fins per inch. There are two coils each 12 feet long, arranged 18 pipes wide by 8 pipes high, resulting in a total of 15,000 sq. ft. of extended coil surface. As shown in Fig. 3, the refrigerant, which is ammonia, is pumped into the coils at the top and flows by gravity back to the surge drum. With this arrangement the coils can be quickly emptied prior to hot gas defrosting by simply stopping the ammonia circulating pump and allowing a few minutes for the coils to drain. Further, the ammonia charge for efficient flooding of the coils is reduced to a minimum. All operating valves and gauges are located in the compressor room. There are no joints or stuffing boxes within the refrigerated enclosure other than welded connections.

Consultant Patterson pointed out that in quick freezing systems it is very important to provide for quick and easy defrosting, since this operation is usually necessary once each cycle, especially during the summer months. As shown in Fig. 3, the hot gas for defrosting first passes

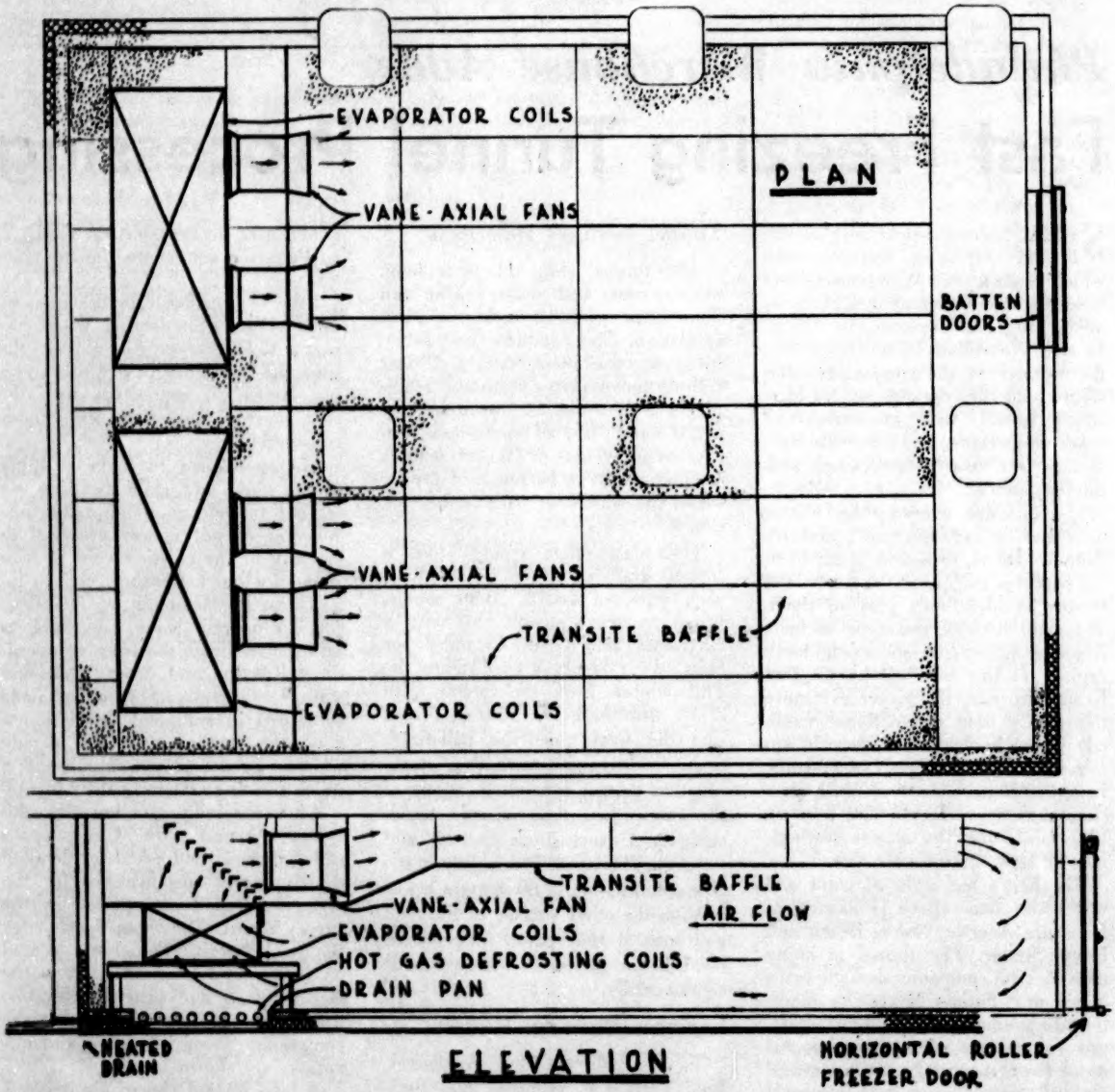


Fig. 2 — Plan and elevation of tunnel, showing coil location, vane-axial fan arrangement, cement-asbestos air distribution ducts, and defrosting drain pan arrangement.

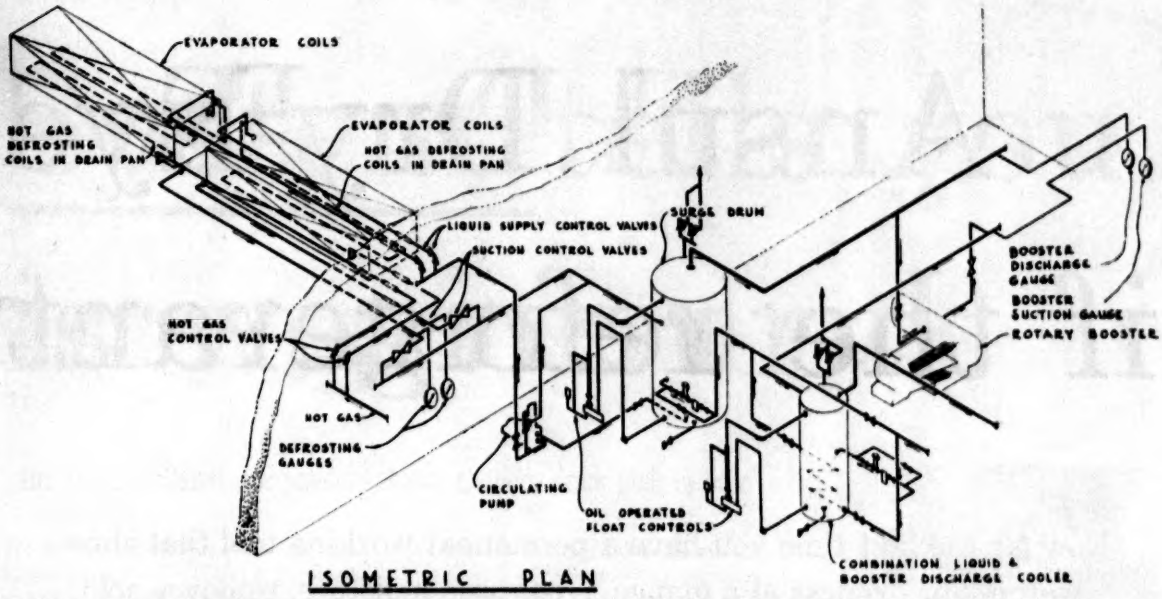


Fig. 3 — Isometric sketch of tunnel coils and piping arrangements; also booster liquid pumps, accumulators and oil operated controls, and associated piping in the machinery room.

through the coils in the drain pan to prevent meltage from the coils from refreezing.

For quick defrosting at this Philadelphia plant, procedure followed is to hold the pressure within the coils around 90 psig which corresponds with a condensing temperature near 60 F. To take the guess-work out of the defrosting operation, gauges are provided for each of the two evaporator coils. To further speed defrosting, it is necessary to keep the condensed liquid drained out about as fast as it accumulates without lowering the condensing temperature of the refrigerant in the coils much below 60 F. This would be difficult to do, without the aid of the defrosting gauges.

Liquid Level Float Control Developed by Job Consultant

Oil operated float controls as shown in Fig. 4, are used to indicate and control the refrigerant levels in both the direct expansion gas-and-liquid cooler and the low-temperature surge drum. These controls operate at equipment room temperature and require no insulation. Although they are at accumulator level here, they can be remotely located above or below the vessels they control.

The operation of this float switch control is simple and positive. With reference to Fig. 4, in normal operation, valves "A" and "B" are open and valve "C" is closed. Liquid ammonia surges out in the uninsulated horizontal line "E" and is partly evaporated. The gas thus formed must overcome the static head of liquid ammonia "Ha" as the only means of escape. To get relief, this gas must exert the same force on the oil in the oil pot "F" as it does on the liquid ammonia surge drum "G". Therefore, it will push oil up into the oil column a distance equal to the height of liquid ammonia "Ha", (making allowance for the difference between the specific gravity of the oil used and the specific gravity of liquid ammonia). Since liquid ammonia is constantly surging in and

(continued on page 59)

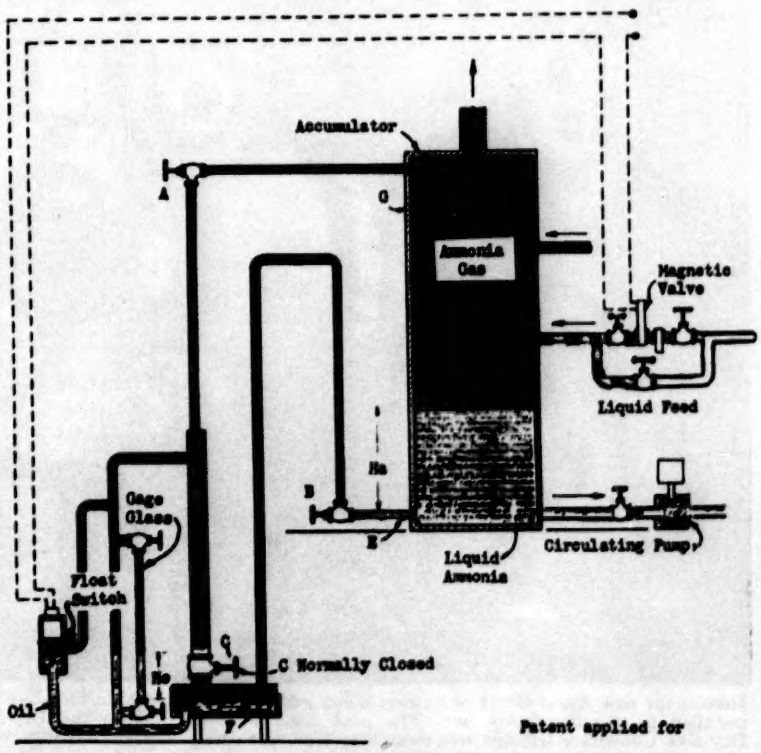
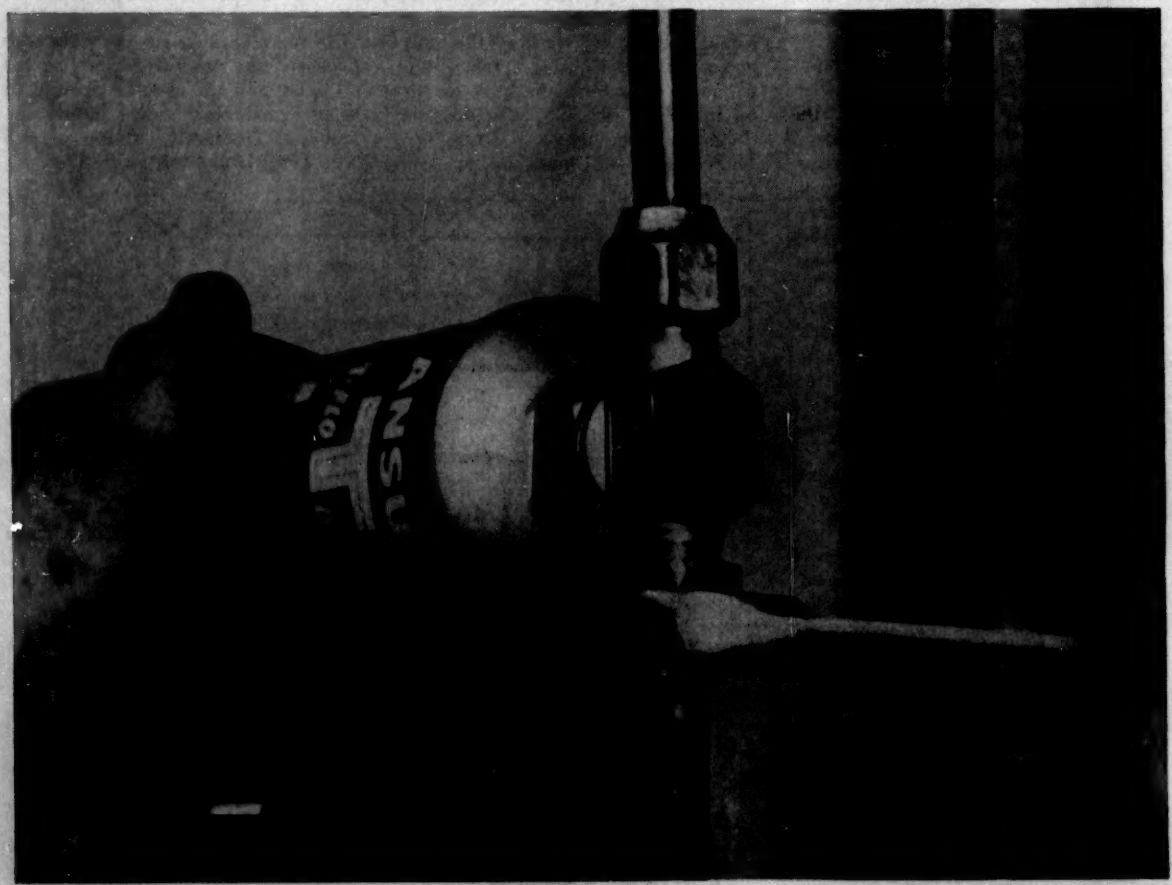


Fig. 4 — Liquid level control used at Phila. Warehouse & Cold Storage Co.

Ansul Dry-Eye if the refrigerant

Now for the first time you have a permanent working tool that shows wetness or dryness at a glance... controls moisture, removes acid.



Here is the new Ansul Dry-Eye System being permanently installed in a refrigeration line. The *pink* color in the Dry-Eye Connector window will change to *blue* when the T-Flo Dry-Eye Cartridge removes the excessive moisture. Once the Dry-Eye System is installed you can replace the Cartridge without breaking the line.

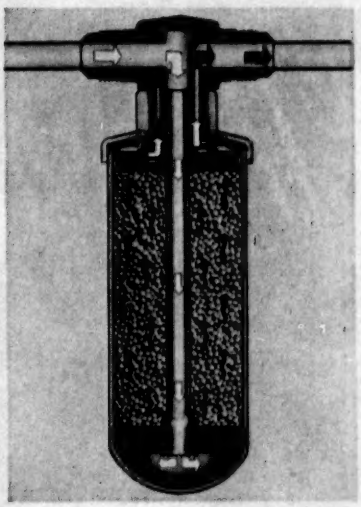
System tells you is wet or dry!

the Dry-Eye Connector window shows changes from pink to blue

No more guessing—now you can know scientifically if the refrigerant is *wet* or *dry*. If the Dry-Eye Connector window shows *blue*, the equipment is in a safe operating condition. If the window shows *pink*, excessive moisture is present—a scientific sign that it's time to take action. To remove the moisture simply change the T-Flo Dry-Eye Cartridge. That's all there is to it. By taking the guesswork out of refrigeration servicing the Dry-Eye Connector cuts callbacks, helps you do a better, more profitable job. It can build new business for you, too, by building your reputation for quality work.

The glass window in the Dry-Eye Connector is guaranteed leakproof at maximum operating pressures.

T-Flo Dry-Eye Cartridge controls moisture, removes acid



A drier should do both for you—*dry deeply* and *remove acid*. Andrite, the drying agent used in the T-Flo Dry-Eye Cartridge, is superior to all other popular desiccants in the deep drying range. This is the range which determines the quantity of desiccant to be used. As for acid removal, Andrite will pick up 4.5% its weight in acid when completely saturated with water.

Performance like this means you can provide better service at a lower operating cost. The extraordinary drying capacity of the T-Flo Dry-Eye Cartridge allows you, in many cases, to install smaller driers than the ones you are now using. Replacement is faster and easier, too, because the T-Flo Dry-Eye Cartridge screws in place like a light bulb—line breaking is not necessary.

Test-try the Ansul Dry-Eye System on one of your "problem" units. See if it doesn't make servicing easier, more profitable. Contact your local Ansul wholesaler for a supply of the Dry-Eye System.

ANSUL CHEMICAL COMPANY, Dept. D-61 Refrigeration Division, Marinette, Wisconsin.

Install the DRY-EYE SYSTEM on old and new units

ANSUL

Pacific Telephone Company Uses Ice Blocks to Lower Conduit

TELEPHONE crews at Olympia, Washington solved a delicate cable relaying problem by employing ice. Highway construction crews had found a telephone conduit too close to the surface of a newly graded street. Included in the 160-foot section of conduit were main toll cables from Seattle to Olympia and points South. Lowering this section of telephone equipment without service interruption and as inexpensively as possible was Pacific Telephone's objective.

The conduit was temporarily suspended by wire from timbers across the open trench. After preparing the bed at the new level, workmen cut ice blocks equal in height to the depth of lowering. When the blocks of ice were in place the supporting wires were cut and, with the melting of the ice, lowering began. Fifty-one hours later the conduit and cable came to rest in the new trench.

An easy job? Don't kid yourself. The trench grade varied from 0 at ends to 18 inches at center. The 1000 pounds of ice from Tacoma was placed in cold storage at Olympia to even the temperature of all the cakes prior to use. It was cut to size at the job site with crosscut saws. Melting of the ice was controlled by placing sand around the blocks to hold the temperature even. The lowering proceeded so gradually the movement was imperceptible.

It was explained that this method of lowering conduit is detailed for telephone men in Bell Telephone System operating practices, but it has not been used in that area previously. Another method, considerably more expensive and risky is to use block and tackle. Complete success was achieved in this operation. The masonry conduit was not cracked or chipped and cable movement in the manhole was only one-eighth inch.

Lowering a telephone conduit with blocks of ice. 1 — Pacific Telephone Construction Foreman Ed Faulkner points to one of the ice blocks used to lower conduit. 2 — Workmen saw a piece of ice to get it the right size for placement under the conduit which was being lowered. The trench that was dug for the conduit slanted, so that it was 18 inches deep at the lowest portion. From this depth, it slanted on the ends to a level with the old conduit bed. Therefore, different sizes in the ice were required. When the ice melted, the conduit was all lowered at the same time. 3 — Construction Foremen Larry Hardt, left, and Ed Faulkner, kneeling, explain their ice-block lowering technique to Olympia Telephone Manager Charles Rowell, center. 4 — With half a ton of ice in position under the conduit, it sinks into its new bed, far removed from the new highway construction overhead. (All photos courtesy of Public Relations Staff, Pacific Tele. Co., Seattle.)

Wage Hour Law May Be Drastically Revised

A BULLETIN from the National Association of Ice Industries calls attention to proposed drastic amendments to the Fair Labor Standards Act, better known as the Wage-Hour Law. One Bill, to which special attention is directed, has been introduced in the Senate. It would:

1. Raise the minimum as high as $1.50 per hour if so determined by Industry Committees, majority memberships of which would be appointed by the Secretary of Labor.

2. Redefine the meaning and scope of the Wage-Hour Law through the use of the term "any activity affecting commerce."

3. Extend the statute of limitations to six years (the present one is two years).

4. Authorize the Secretary of Labor to bring suits against employers on behalf of employees, with or without the latters' consent.

5. Eliminate a large portion of existing exemptions of the present Act, including those for "white collar" workers, outside salesmen, etc., unless they are paid a minimum of $6,000 a year.

Another Bill has been introduced in the Senate, which is backed by the President, providing for a raise in minimum wages from 75 to 90 cents per hour.

On the House side 33 separate Bills have been prepared, most of which call for a minimum of $1.25 per hour.

A Bill which will reflect the administrations viewpoint on all issues is in preparation. However it is expected to fall short of those desired by the labor forces and therein lies the possibility that management, including the ice industry, may not come out of this legislative fight with anything half-way satisfactory. It is expected also that a number of exemptions previously favoring the ice industry may be eliminated.

Another result of some proposed legislation, it is pointed out, would further the encroachment of Federal controls into the field of commerce that is strictly intrastate in character. If the proponents of this type of legislation are successful, they will to a very substantial degree succeed in removing the thin remaining thread that separates intra and interstate activities.

This situation is called to the attention of members of the ice industry, with the comment that the battle against this legislation cannot be won in Washington; instead by constituents at the "grassroots" level.

Railway Express Adds Three Hundred New Ice Refrigerator Cars

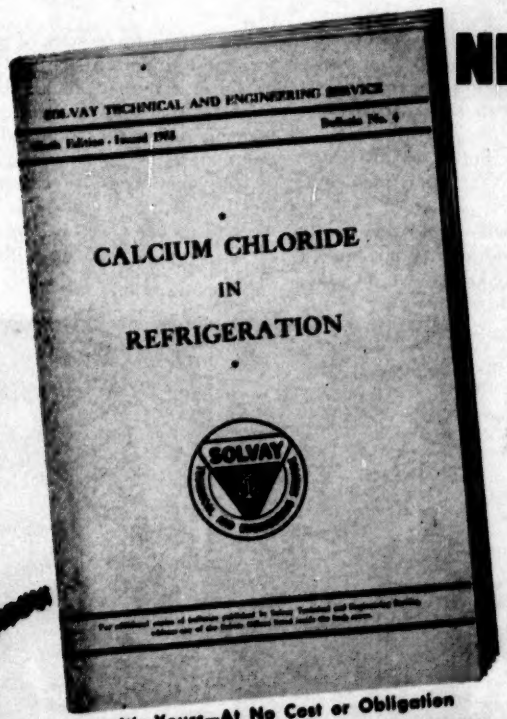
THE PURCHASE of 300 new 50-ton high-speed refrigerator railroad cars by Railway Express Agency, Inc. at a cost of more than six million dollars was announced late in January by A. L. Hammell, president. Built to the Agency's specifications, the new express refrigerator cars reflect the latest technical and engineering advancements of its type.

The new "reefers" will be manufactured by the General American Transportation Corporation at its East Chicago, Ill. shops, with additional parts and materials, which will go into the construction of the units, being supplied by 42 other companies. The Agency has been authorized by the Office of Defense Mobilization to write off 85 percent of the cost during the first five years.

Designed and built to the Railway Express Agency's specifications, the new "reefers" like the one pictured above will incorporate the latest technical and engineering advancements enabling them to operate in passenger train service speeds up to 100 mph.

The new refrigerator cars will be placed in express service as they are received. Water ice is the refrigerating media. Equipped for passenger service, the new cars can operate at speeds up to 100 mph.

Some of the features incorporated in the new equipment are: 55 ft. long, 50-ton, with a capacity of 2360 cu. ft.; riveted, copper-bearing steel construction; self-supporting 4-inch blanket-type fiberglas insulation; specially arranged air spaces in side walls, and a two-side reflective coating of "Silvercote" as a vapor and temperature barrier; six generator-operated overhead electric fans distributing cool air throughout, and equalizing car temperatures for maximum refrigerator protection; six-foot-wide sliding doors of improved design with double ball bearing rollers and screw-type closure device for airtight sealing and locking to prevent air and dust leakage.



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56-4

Cutting The Costs of Processing Ice

THOMAS G. CARROLL
City Ice Delivery Co.
Wichita, Kansas

IN 1951 we were selling processed ice in an old-fashioned small way. We had to haul our block ice to our processing room, which was very small, and then crush and process it. All our commercial ice was delivered in one hundred pound canvas bags. The only paper bags we were using then was a 10-pound bag for our vendors. You can see why by this old method our processing cost was over $3.00 per ton.

Starting in 1952, we moved our processing equipment over to our main plant. We still have no modern equipment except a Lily Sizer, but we started to go after the sized ice business in a larger way. You have no doubt heard of our trade-mark, "Redy-Pak" sized ice.

Well, when summer hit, we were really in a jam. On the processing of sized ice for the commerical trade, we had two crews of nine men each working 11 hours each and three crews of six girls working eight hours each, the girls sacking, stapling and tying the 10-pound bags for the vendors. The ice had to be poured into an old wooden hopper and then the girls would use a hand lever to operate the chute to fill the bags and, brother! if you don't think that was an expensive operation, you should try it sometime. But even operating under those conditions, we somehow managed to cut the cost to $2.12 a ton and about four cents per bag on the package ice.

Paper presented at Annual Ice Convention.

Modern Equipment and Methods

In 1953, we started again with ideas that we had gathered at conventions and from distributors. We first went to all paper bags. Then we had a manufacturer build for us an automatic bag weigher and filler for our 10-pound bags. We bought a Hamer wire tieing machine and this we used mostly on the 10-pound bags and tied the others by hand, which, as you know, is a slow process. By using the tier and automatic weigher, we eliminated the 18 girls and did the job very well, except we still had to have too many men in the over-all operation. Our over-all operation cost dropped from $2.12 to $1.12 per ton, and to two cents per bag on the small ones.

Starting in 1954, the first thing we did was to put in a sanitation program. Letters were sent to all customers advising them of our sanitation program, all men carrying health certificates and in uniform. As a matter of fact, they weren't always in uniform. Sometimes a fellow would show up, you know, with his ordinary clothes on, he didn't get into his uniform, but if at all possible, we tried to get our men in uniform.

After considerable research, we bought a Lockwood sewing machine, the first one, to my knowledge, in use in the ice industry. We also bought an Eskimo automatic weigher and bagger for the 50-pound bags. We used the sewing machine for the 10-pound bags and the wire tier for the 50-pound bags. Thus, we cut our labor down from nine men in 1943 to five and six men in 1954, and they do all the crushing, both 50-pound bags and 10-pound bags, and filling of them.

Closeup view of sewing machine used for small bags of processed ice.

We sell all three sizes of processed ice, snow, fountain size and sized or nut size, and they do all the operations, with one man feeding it, one man operating the 50-pound bagger, one man palleting same and two men on the small bags. In extremely hot weather such as we had this summer, we had to use a second crew a part of the time to keep up with the demand.

Handling processed ice in plant of City Ice Delivery Company, Wichita, Kansas. Left: Filling, sewing, and palleting small bags. Right: Similar operation with larger bags in which the 50-pound bags are wire tied.

We now have a second sewing machine. This, we use as a stand-by unit. If one machine has a little breakdown or a little trouble, we can now switch over to the other one.

In 1951 and 1952, we were dumping ton after ton of snow ice. Today, we sell every bit of it. Sometimes I have to start up the crew in order to get enough snow to supply the demand.

Breakdown of Costs

A breakdown of the cost of 50-pound bags on a ton basis is $1.92. The cost of the ice is around $3.50. The labor is 66 cents a ton and the wire ties are four cents; so the cost per ton, including the ice, the labor, the wire ties and the bags, ready for delivery to the docks, was $6.16 a ton, approximately.

On the 10-pound bags, the cost of the bags is a fraction over two cents each; the cost of the ice is around $1.40; labor, 88 cents; and twine, 19 cents, or $4.49 per hundred bags, or a fraction under 4½ cents ready for the vending machines.

The success of the operation is to get good help, workers who won't tear your equipment up. We had some of that trouble too. With our present set-up we have cut our cost of processing ice from over $3.00 a ton in 1951 to 66 cents a ton in 1954. On our package ice, we have cut the cost from four cents a bag in 1951 to a little less than one cent per bag in 1954.

Our percentage of processed ice is 43 percent of all ice sold. On the vendors, it runs about 60 percent crushed to 40 percent block. Our percentage of labor saved on this operation over the old method is 70 percent per ton, or considerably more than enough to pay for the equipment in one season or two seasons, and it has brought about a 100 percent smoother operation.

We are using the same equipment we started with. Although there are many modern ice processing equipments available, as long as you have a balanced operation and you can work along that way, it can be a very profitable operation. During the peak of the summer we did have to have probably a couple more men on the over-all operation, for instance one man feeding the crusher, one man for the 50-pound bagger, one man palleting same and, on the little bags, two and three men, depending on how many bags we have to put out. We don't have any surplus storage; we have to operate day to day. In other words, today we put out what will be going out tomorrow.

Dawal Farms, Inc.
Dade County, Florida

to protect the "garden crispness" of your precious crop of FRESH PICKED VEGETABLES

CHECK with VILTER

Quality vegetables carefully picked at the height of perfection . . . promptly cooled . . . Vilter cooled the scientific, modern way to preserve their nutritional goodness and protect their crisp garden freshness—that's the Dawal Farm way of marketing its produce . . . a profitable way, too.

With over 70,000 acres of coral rock land under cultivation, Dawal Farms, Inc., of Dade County, Florida, needed a pre-cooling plant in the Redlands district to properly prepare corn for shipment to northern markets. Such a plant, with all Vilter refrigeration equipment, was built at Princeton, Florida.

Here picked corn is processed at the rate of 1000 fifty-pound crates per hour . . . cooling the corn from 85° to 38°. This is how it is done: Crated sweet corn moves through a sluicer tank equipped with Vilter Raceway Coils and Vertical Agitators . . . the corn being cooled by circulating 32° water and water spray. From here the crates move into a cold storage room maintained at 45° by a Vilter Air Unit. Adjoining this room is the ice storage bin where Ice Briquettes are made by two 30-ton Vilter Pakicers.

Five Vilter VMC compressors supply the refrigeration to the sluicer tank cooling equipment, the Pakicers, product storage room and the ice bin. Four Vilter condensers and one 3000-pound Vilter receiver complete the installation.

The Dawal Farm people are proud of this pre-cooling plant . . . and are completely satisfied with the fine service provided by the Vilter equipment. For tops in refrigeration and air conditioning, why don't you, too, talk with the Vilter people.

Installation engineered by and equipment sold and installed by Vilter distributor, W. L. Filbert, Inc., Miami, Florida.

Vilter.

Your nearby VILTER Representative or Distributor will be glad to show you how VILTER refrigeration can help you.

REFRIGERATION and AIR CONDITIONING

THE VILTER MANUFACTURING COMPANY, MILWAUKEE 7, WIS.

Air Units • Ammonia & Freon Compressors • Booster Compressors • Baudelot Coolers • Water and Brine Coolers • Blast Freezers • Evaporative & Shell & Tube Condensers • Pipe Coils • Valves & Fittings • Pakice and Polarflake Ice Machines

New product combines finish in waterproof,

insulation and durable block

Tough ceramic finish and cellular glass insulation are fused together

Now you can make your insulated walls entirely of glass including the finish on the insulation. You can do it by using a single new product . . . *Duraface* FOAMGLAS. That's Pittsburgh Corning's unique cellular glass insulation intra-fused with a white crust of denser, sealed glass cells.

You can scrub it or hose it down. It's waterproof.

You don't have to worry about fire or vermin. It's completely inorganic.

You can avoid trouble with cracking or bulging of plaster finishes. *Duraface* FOAMGLAS has an integral finish that can't peel or separate. It'll take greater impacts than ordinary finishes.

This remarkable new product may solve *your* insulating and finish problems! Wouldn't you like to see a sample and get descriptive folder? Please use coupon today.

® "Duraface FOAMGLAS" is a trademark of Pittsburgh Corning Corporation.

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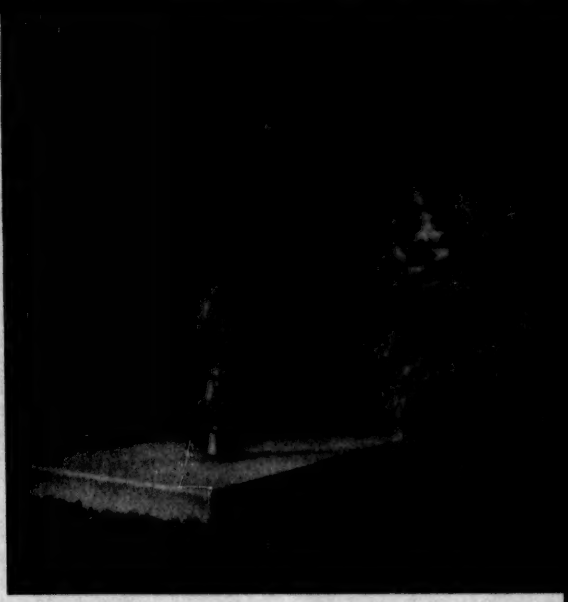
FIREPROOF BLOCKS of *Duraface* FOAMGLAS help protect your plant. They can not burn or transmit fire.



EASY MAINTENANCE is built right in *Duraface* FOAMGLAS. It'll withstand greater impacts than cement plaster finishes. Its integral finish can't blister or peel.

SANITARY WALLS are assured because *Duraface* FOAMGLAS is vermin-proof and moisture-proof. When you wash down the insulation, it stays dry and efficient.

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☐ Please send me a free sample of *Duraface* FOAMGLAS and your new folder with detailed information.

☐ Send engineer to discuss its use.

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Company _____

Address _____

City _____ Zone _____ State _____

Storage Survey Optimistic

More Refrigerated Space Needed For '55

RESULTS of a survey of public refrigerated warehouses conducted by the National Association of Refrigerated Warehouses presents a very optimistic picture of the 1955 business outlook. A brief summary of the returns are given as follows:

***Question*: what is your estimate of the percent of increase or decrease in your volume for 1955 as compared to 1954?**

Frozen Foods: All replies show an expected increase in volume up to 20 to 25 percent.

Poultry, Butter and Eggs: It is expected that there will be only a slight increase in volume, with apparent decline in shell egg production.

Meats: Total production which reached an all-time peak in 1954, is expected to be slightly higher. Decreases in beef and lamb and mutton will be more than offset by increased production of pork and veal. An upward trend of meat production to fulfill the needs of an expanding population is most likely to increase the future freezer needs of the industry. In addition the shift from long cure to quick cure means more pork products.

Apples: It is expected that the 1955 crop will at least equal that of 1954, and possibly exceed it.

Government: Government purchases of foodstuffs probably will be slightly less.

***Question*: What is your estimate as to your public storage requirements for 1955, and will these requirements be local, regional, or national?**

Frozen Foods: Nineteen of the leading frozen food producers express their probable needs of warehouse space from "not so much because of plant construction of our own," to some 15 percent increase. Many of them say they will need about the same, but a considerable larger number they will need more, and a few predict decreased needs.

Meats: As a result of increased pork production, public storage requirements during the early part of 1955 are expected to be greater than in the corresponding period last year.

Poultry, Butter and Eggs: About the same as 1954 or, in the Pacific region, approx. 10 percent higher.

Apples: Holdings are expected to start the year slightly higher; greater in the Appalachian area, Western New York, possibly the Hudson Valley and in California; but less in the Northwest, New England and the Midwest.

Government: It is expected that CCC stocks will average less. The Army expects no increase for space; the Navy slightly less.

***Question*: How can refrigerated warehouses serve you better?**

Frozen Foods: Speed up notification of warehouse withdrawals. In some instances lack of proper facilities require us to ship merchandise prior to the time it is needed, increasing our costs. Less errors on deliveries and more emphasis on courtesy and consideration. By sending warehouse receipts and delivery tickets more promptly and by eliminating erroneous information on tickets.

Submit reports of withdrawals and inventories at the time requested. Make shipments directly from freezer. Do not allow frozen products to set on docks. Answer communications promptly and contact if uncertain of correct procedure. Be sure all correspondence and releases are properly identified, showing warehouse name and address. Warehouse industry should adopt a standard release or withdrawal form.

Frozen food producers want and need efficient zero warehousing. Warehousemen can make a valuable contribution to the frozen food industry and to the welfare of their own industry by adopting and maintaining a cooperative spirit—by considering sympathetically the problems of their customer industry; for instance, consideration might be given to improving in-transit privileges.

More freezer space to match growth of frozen food industry; the warehouse industry cannot stand pat with the capacity it now has.

These are the highlights of critical comment from the frozen food industry, although presented in a cooperative spirit. Typical of many non-critical expressions is the statement that "our warehouse service, with few exceptions, is quite satisfactory."

Meats: Increase the availability of freezer space. Development of more accurate means of measuring and controlling relative humidity in freezers in the protection of meats from "freezer burn" or development of rancidity.

Poultry, Butter and Eggs: Coordinate with industry, suitable reports on products in storage; more information on correct warehouse temperature and humidity in a more easily read form. Refrigerated warehouses do a fine job. They serve beyond the call of duty and often extend themselves to assist their customers and those favors are never forgotten.

Apples: Refrigerated warehouses are doing an excellent job. But it is suggested that they have available for the storer a report the first of each month on the varieties in storage.

Government: Very complimentary regarding the service provided by warehouses. No critical comment.

The Research Picture By The Refrigeration Research Foundation

Any predictions of the future of refrigerated warehousing must be tied to the future economy of the United States or even the world as a whole. Indexes, such as increase in population, increase in gross national product, personal income and standard of living, are indexes of growth in refrigeration. Our success is based on continuous development and expansion.

The increase in retail food sales alone would permit an optimistic atmosphere (up 1.8 percent in 1954 over 1953 to $40,412,000,000). Add to this that frozen food sales are nearing five percent of the total food sales and are predicted to climb to 10 percent of the total food dollar by 1960, should make the refrigeration industry smile openly. Precooked frozen foods, which now account for almost 10 percent of all frozen food sales, are predicted by Tide Magazine to skyrocket to a volume larger than all frozen foods combined in the next five years.

Poultry: Outlook is optimistic for chilled and frozen poultry meat; improvement in quality, packaging and the almost universal switch from New York dressed to frozen and fresh

eviscerated or cut-up poultry, has enlarged the market for these products. Improved methods for egg powder manufacture, with resultant quality improvement, have probably limited the growth of the frozen egg pack, although frozen eggs will continue to be important. New egg-solid industry will still depend, to a considerable degree, upon frozen eggs as the raw material for year-round drying operations. Some of the new dry solid products may require cold storage; others may not.

Fisheries Products: Fish stick production has been fantastic. First six months of 1954 boasted over 4000 percent production increase over a similar period in 1953. Research is under way at present to prevent growing pains which could arise in such an infant industry. Relatively new frozen fisheries products, such as sticks, breaded shrimp, crabmeat, frozen oysters and fillets have all developed because of freezing techniques and frozen food merchandising outlets. Steady and fairly rapid extension of the national market for fisheries products in recent years makes the future of these products look bright.

Meats: Distributors and packers alike see definite expansion ahead for packaged frozen meats. "Frozen portion controlled meat offers the greatest sales potential of any institutional frozen item", said Robert W. Grant, Jr., President of Grant Groceries Co. Sales potential is fully as promising in the retail field, although retailer tendency to give frozen meats a high "specialty" markup still remains a major obstacle. Prepared frozen meat dishes are on the increase.

Frozen Fruits and Vegetables and Frozen Juices: Initial very rapid growth appears to be over. Can expect an unspectacular but nevertheless sizeable growth in this area in future years as the population increases and more people become aware of the values in frozen foods. National Wholesale Frozen Food Distributors states that the 1955 Florida orange crop will permit a 10 percent increase in orange juice concentrate this year.

Other Frozen Products: Frozen bakery goods seem destined to become a large item in frozen foods; has been predicted that in five years, 80 percent of all bakery products will be frozen at some time during their marketing. Frozen candies certainly are here to stay and are gradually increasing in volume. Frozen soups are becoming items in the food markets. Frozen concentrated milk is still not a commercial reality, although much progress has been made in the technical phases of its production, which is promising.

Fresh Fruits and Vegetables: Trend toward mechanization in these industries continues. Refrigeration is the essential basic factor for quality retention, even with all the new handling and disease control methods. Prepackaging nearer the source, and mechanized handling all the way, are conspicuous features of progress and development. Both either increase storage life or the need for refrigeration.

Other Unfrozen Products: Many manufacturers outside the food industry, and many within the industry, are finding refrigeration the answer to the problem of seasonal sales and procurement. Storage battery makers, plastics manufacturers, nurserymen and seed dealers and pharmaceutical producers are examples of outside industries to which we can render a service and these and others offer a large potential of future business.

Within the food industry, there are many commodities which would

(continued on page 59)

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Bureau of Standards Demonstrates Low Temperature Research

AN OPEN house held by the National Bureau of Standards at Washington early in February was attended by several hundred leaders in the field of science, industry, government, education and publishing. The guests were conducted on guided tours of the various laboratories of the Bureau.

Three of the laboratories in which they expressed particular interest were those which demonstrated work in extremely low temperatures, atomic flames, and a new advance in high-speed electronic computers.

The work in low temperatures deals with the properties of matter within a few degrees of the absolute zero of temperature (−460 degrees Fahrenheit), where the motions of atoms and molecules are supposed to stop. Here many unusual and fascinating phenomena occur.

The Bureau has achieved some of the lowest temperatures ever recorded. In this work methods of accurately measuring temperatures approaching −460 degrees Fahrenheit (absolute zero) is being developed. The guests were shown some of the equipment and materials used in this work. Certain gases, particularly helium, when liquefied have temperatures almost this low.

The guests were shown flasks of this extremely rare liquid and some of the effects it has on other materials. One of these effects is known as superconductivity. This phenomenon occurs when certain metals such as lead are cooled to a few degrees above absolute zero. When lead is at this temperature, it loses all its resistance to the flow of electricity. Once a current is induced in superconducting lead, it will flow indefinitely as long as the lead is kept below a certain critical temperature.

To demonstrate this, Bureau scientist Dr. R. P. Hudson, assisted by Dr. Ernest Ambler, showed the guests how a bar magnet would float over a lead dish immersed in liquid helium in apparent defiance of gravity. Dr. Hudson said this was caused by the superconduction of the lead. Throughout the experiment the liquid helium gently boiled away at a temperature over 400 degrees blow zero Fahrenheit.

At very low temperatures, Dr. Hudson explained, the normal vibrating motions of atoms and molecules are greatly slowed down, and the properties of matter undergo extraordinary changes. For example, within a few degrees of the absolute zero of temperature (where all atomic and molecular motions are supposed to stop) liquid helium becomes a magic fluid showing characteristics of all three states of matter—solid, liquid and gas.

This fluid, known as the "quantum fluid," passes through air-tight seals without resistance. It also flows up the side of a containing vessel at remarkable speed in seeming defiance of the law of gravity.

The unusual properties of helium near absolute zero have been explained by mathematical theories which indicate that the very cold helium consists of two kinds of fluids. One portion is a normal fluid; the other is a superfluid which accounts for the unusual phenomena observed. The atoms of the superfluid are so cold that they no longer bounce around, yet the attractive forces between them are not great enough to produce a rigid solid like ice.

Low temperature research is an area of pure science in which the objective is new basic knowledge about matter and the universe. Scientists are becoming increasingly interested in the remarkable phenomena that occur near absolute zero. At present over 80 laboratories in this country are engaged in low temperature research. Primary aim of NBS work in low temperature is to

provide the new methods of accurate temperature measurement which science needs in order to advance in this important new field.

Low temperature research also provides new scientific techniques for understanding the basic properties of materials and for using them to better advantage. Engineers are also becoming interested in the effect of extreme low temperatures on the strength of materials like metals and plastics.

Natural Ice Harvest In The News

THE ESPY Ice Company of Denver, Colo. is making the headlines. Its natural ice harvesting operations have attracted newsmen and resulted in pages of excellent publicity. The Denver Post of January 24 devoted a page to pictures and a story on cutting ice from the company lake some 9,000 feet up in the Rockies. On January 21, the Central City Colo. "Tommy Knawker" carried a full page story on the operation.

In 1955, natural ice accounted for only 71,000 tons of over 32,000,000 tons of ice produced by the industry. This year the Espy Ice Company, one of the largest natural ice harvesters, will cut 9,200 of the total.

Old Timers in the industry will be interested in this account in the Post which will bring back memories.

"Late last fall the company closed the gates on its dam across South Boulder Creek forming the lake, then the ice was checked periodically for thickness. When the gauge showed 20 inches and more, the harvest began. Snow was first scraped away, using a jeep-mounted blade. A scribing plow is used to mark the ice surface in 23-inch squares. A power saw mounted on skids and pulled by two men follows, cutting grooves 14 inches deep across the ice along the scribe marks.

After being grooved, the ice is cut all the way through with a "jig-saw, and workmen use pikes and spuds to break it into floes of about 100 tons each. The floes are pulled down the lake, one man can move them, and respudded into fours, pairs, and finally into single blocks. A conveyor belt, dipping five feet into the water, lifts the blocks up and carries them through a planer which shaves them to a uniform 20-inch thickness. Each block weighs approximately 350 pounds."

The ice is then loaded into box cars for shipment to Denver where it is stored. The entire harvest is for the Denver & Rio Grande Western Railroad, and will be used for icing refrigerator cars.

Frozen Food Briefs

THE 1954 California frozen fruit pack showed a small increase, but the frozen vegetable pack dropped off considerably. The fruit pack totaled 149,404,821 pounds as compared with 143,668,492 in 1953. The vegetable pack was 219,973,877 pounds compared with 282,345,302 pounds in 1953.

Stokely Van Camp, Inc., has started orange concentrate production at a new plant in Haines City, Fla. The plant's output will be packed under the Honor Brand and Pictsweet labels.

Three retailers, addressing a meeting of the Frozen Food Distributors Association of California, predicted that within the next five years frozen foods may account for nine percent of total grocery store sales, provided the cabinet space problem can be solved.

The Fish and Wildlife Service recently reported that 1954 production of fish sticks totaled 50,088,000 pounds, as compared with 7,500,000 pounds produced in 1953. —NARW Cold Facts.

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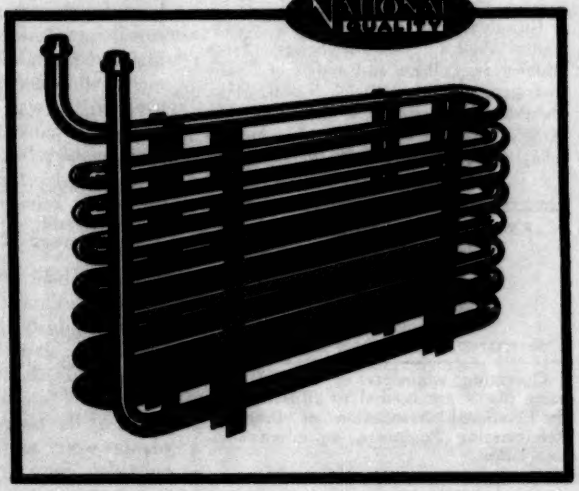

Practical Refrigerating Engineer

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS

The Characteristics and Applications of Refrigerants Old and New

GUY R. KING
Vice-Chairman
Education Committee, NAPRE

This paper by NAPRE's Educational Vice-Chairman, Guy R. King, is the first of a series of two articles. Next month, W. R. Barnard will present "Selecting and Using 'Freon' Refrigerants". Both are considered by NAPRE to be ideal bibliography or additional reading material for the Association's course toward a Certificate of Proficiency in refrigerating engineering.

IT HAS become increasingly important for the modern engineer to be familiar with the new, as well as the old refrigerants. In the January 1955 INDUSTRIAL REFRIGERATION, is an article describing a 3600-ton refrigeration plant in the new Northland Center, Detroit, using "Carrene-2" as the refrigerant. Operators in hotels, hospitals and many office buildings find a "Freon", "Genetron" or "Carrene" in the air conditioning system, and a different "Freon" or "Genetron" in the kitchen, restaurant or bar. Men who take charge of refrigeration facilities at military bases are likely to have ammonia in an ice making and cold storage plant, and from dozens to hundreds of "Freon" commercial and domestic fixtures scattered throughout the base.

To understand the development of all these refrigerants, a bit of history is helpful. Ammonia (NH_3) has been and still is a time honored refrigerant. It was used in the first successful mechanical refrigeration equipment, and was practically the only refrigerant in the early development of brewery refrigeration, packing houses, ice plants, cold storage plants, etc. And today, in spite of the number of new refrigerants developed, it is the author's opinion that there are probably more tons of refrigeration produced with ammonia than with all these new refrigerants put together.

As the application of refrigeration expanded, there was some fear of the irritating and toxic effect of ammonia for certain applications. Carbon dioxide (CO_2) was tried, and used, where the hazard of ammonia was feared. The main use of carbon dioxide was in passenger ships and hospitals. However, its pressures were excessive compared to ammonia. The loss of refrigerant due to high pressures, no convenient method of testing for leaks, and its high hp requirements all added up to discourage its use. So it was found only where safety was more important than good, economical refrigeration. It has since been largely replaced with one of the newer refrigerants.

NH_3 Pioneer Refrigerant

Up to about 1900, all the development of mechanical refrigeration was in the industrial field. After that, there were experiments and designs aimed toward building smaller refrigeration plants suitable for retail stores or the home kitchen. Ammonia plants were manufactured in sizes suitable for creameries, butcher shops, and similar applications. But there was also considerable investigation of other possible refrigerants.

A lower pressure than ammonia was desired so lighter equipment could be used. Objective: a refrigerant which would cause no trouble with copper coils; where lines could be made out of light copper tubing. Between 1915 and 1920, three different companies using sulphur dioxide (SO_2) as a refrigerant began to show some success. One of these firms was making an ice cream cabinet to do away with the salt and ice method of storing for the retail trade. The other two were developing a refrigerator for the home kitchen. Their success gave impetus to sulphur dioxide design.

Discover "Safe" Series

About 1920, methyl chloride (CH_3Cl) was introduced as a refrigerant in an attempt to get away from the irritating and corrosive properties of sulphur dioxide. But methyl chloride was still toxic, and was also inflammable. About the middle 1920's, leaders of the small refrigeration unit field felt that an entirely new refrigerant was needed if household and commercial refrigeration was to fulfill its potentialities. They put a staff of chemists to work to solve this problem. These scientists came up, not with one refrigerant, but a whole family of them called halogenated hydrocarbons. Out of this family they chose one, di-chloro-di-fluoro-methane, for immediate manufacture. To simplify terminology, a numbering system was worked out to fit this family. "Freon-12" was the name given this new refrigerant.

Practical engineers can better understand this family and its significance by reviewing a bit of chemistry. Hydrocarbons are chemical compounds of hydrogen and carbon. Crude oil is a mixture of several dozen hydrocarbons. The simplest of these is methane, the main constituent of natural gas. Its chemical symbol is CH_4, but the chemist often

Guy R. King is Refrigeration Instructor, Santa Monica Technical School, Santa Monica Jr. College, and author of "Basic Refrigeration", the official NAPRE text, published by Nickerson & Collins Co. Mr. King's paper was given before Los Angeles Chapter, NAPRE, January 19, 1955.

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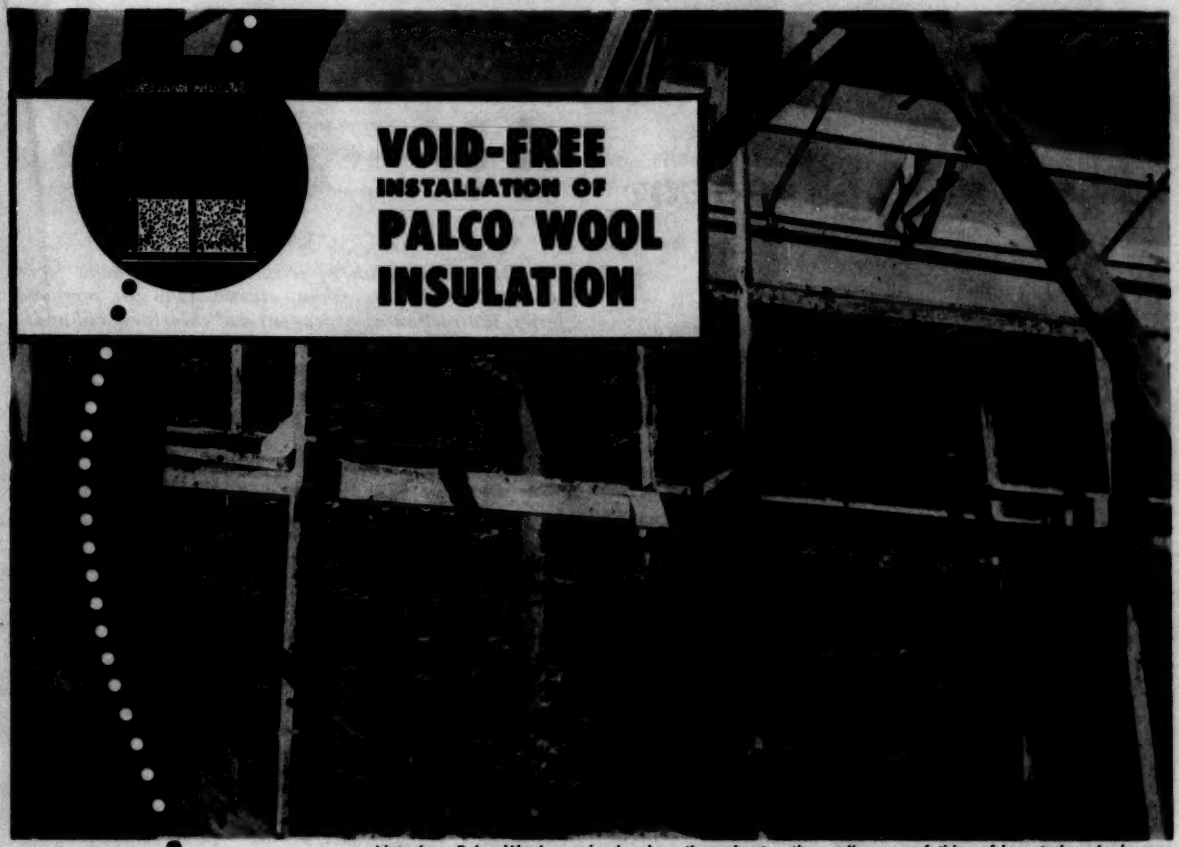

VOID-FREE INSTALLATION OF PALCO WOOL INSULATION

Note how Palco Wool remains in place throughout entire wall areas of this refrigerated and air conditioned hide storage house of the A. K. Salz Company of Santa Cruz, Calif., allowing full inspection before sheathing is applied.

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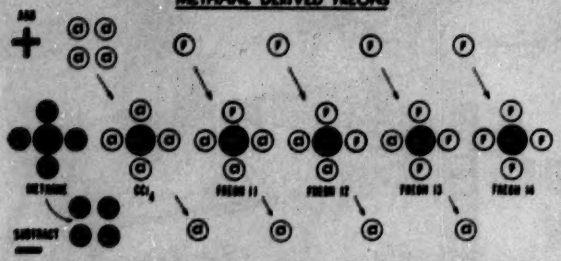

Fig. 1 — Refrigerant derivatives of the hydrocarbon, methane. By "subtracting" hydrogen atoms and "adding" halogens of Chlorine and/or Fluorine, a family of "safe" refrigerants was developed. In this representation of each refrigerant molecule, solid black figures represent Hydrogen atoms: those labelled "C", carbon; CL, chlorine and F, fluorine. — Illustration Courtesy of W. R. Barnard.

Fig. 2 — Derivation of trichlorotrifluoroethane from the crude oil hydrocarbon, ethane. Like the methane series, subtraction of hydrogens and chlorines, and addition of chlorines and fluorines, respectively, developes new gases of various characteristics. Legend for symbols in Fig. 1 applies here also. — Courtesy, W. R. Barnard.

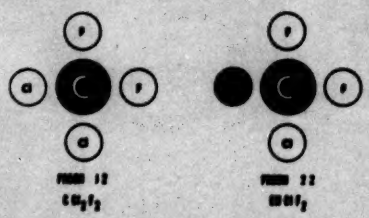

Fig. 5 — Molecular structure, trade names, and chemical formula of two "numbered" refrigerants. — sketch courtesy W. R. Barnard.

writes it as shown in Fig. 1. This method of writing the formula makes it easier to remember the elements of one carbon and four hydrogens.

The next compound in the list is ethane, written C_2H_6, or as shown in Fig. 2. If the structural form of these substances is kept in mind, they will readily assist an engineer in visualizing the molecular variations of this family of compounds.

Physical Properties Change With Each New Derivative

Using methane as a base, chemists removed hydrogen atoms, one by one. Substituting chlorine atoms (a chemical of the halogen family) for them, but still keeping the methane form with one carbon and four other elements, they derived the list of compounds shown in Table 1. These chemical manipulations resulted in many important changes in the properties of the substances.

Noticed first by the refrigeration engineer are the increasing boiling and freezing points. Methane, the first in the table is highly inflammable. Each step down that list gets decreasingly flammable. The last is even used as a fire extinguisher! In one case, more than one name is given. These are the various names by which this substance is known.

This phenomena (decreasing flammability) was known before the chemists went to work on this problem of finding a "safe" refrigerant. What they found was that with carbon tetrachloride as a base form and substituting fluorine (another halogen), a new series could be developed. This is shown in Table 2; or by using chloroform (fourth compound,

TABLE 1 — PROPERTIES OF SOME COMPOUNDS DERIVED FROM METHANE

Trade Name	Formula	Chemical Name	Boil Temp	Press at 5°	Press at 86°	Freeze Temp
	CH_4	Methane	−259°			
	CH_3Cl	Methyl chloride	− 11°	6	80	−144°
Carrene 1	CH_2Cl_2	Methylene chloride Di-chloro-methane	105°	27.6"	9.5"	−142°
	$CHCl_3$	Chloroform	140°			
	CCl_4	Carbon tetra-chloride	171°			

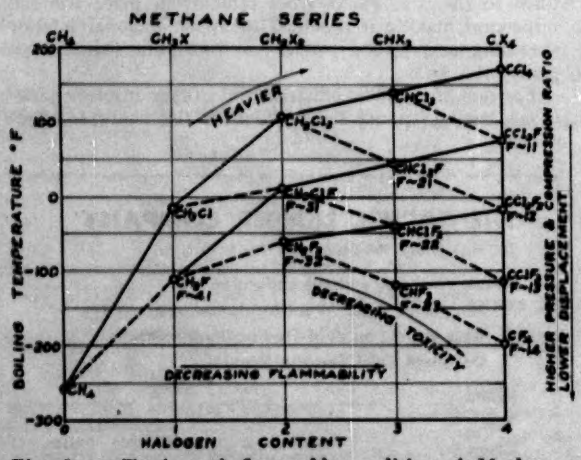

Fig. 3 — Toxic and flammable qualities of Methane Series, Halogenated Refrigerants. — sketch based on data by Kinetic Chemicals.

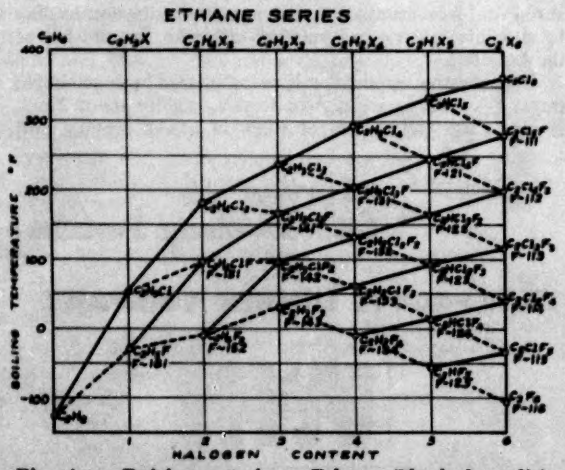

Fig. 4 — Refrigerants from Ethane. Physical qualities are similar to Methane series. — data by Kinetic Chemicals.

TABLE 2 — CHARACTERISTICS OF CARBON TETRA-CHLORIDE BASE REFRIGERANTS

Trade Name	Formula	Chemical Name	Boil Temp	Press at 5°	Press at 86°	Freeze Temp
	CCl_4	Carbon tetra-chloride	171°			
Carrene 2 Freon 11 Genetron 11	CCl_3F	Tri-chloro-mono-fluoro-methane	75°	24"	3.6	−168°
Freon 12 Genetron 12	CCl_2F_2	Di-chloro-di-fluoro-methane	− 22°	12	93	−252°
Freon 13	$CClF_3$	Mono-chloro-tri-fluoro-methane	−114°	177	*	−296°
Freon 14	CF_4	Tetra-fluoro-methane	−198°	*	*	−312

*These temperatures are above the critical temperature.

table 1) as a base, still another series could be developed, Table 3. Again, noticed immediately would be the change in boiling temperatures. All the compounds in Tables 2 and 3 remain non-inflammable. Also, reading from top to bottom in each table, the toxic properties decrease. These properties and their relationship are shown in Fig. 3.

A similar series is derived from ethane. However, due to the greater number of elements in the compound, more variations are possible. Table 4 gives the more common of these, and Fig. 4 shows the range of possibilities.

Thus, an entirely new group of substances were created which were stable, non-toxic and non-inflammable. Substances could be chosen with boiling points approaching that of water, or nearly 200 F below zero, and of course, many points between. A few make excellent refrigerants for ordinary applications. Most, if not all of them, could find use as a refrigerant in special applications.

Chemical Name Describes Elements of the Compound

To help understand some of the terminology used, it will be noticed that the chemical name is an exact description of the molecular makeup of the substance. (These names are usually run together, but here they are hyphenated to help break them down and show their structure.) Thus, di-chloro-di-fluoro-methane is a methane form containing two chlorine atoms and two fluorine atoms. Its chemical symbol is CCl_2F_2.

Mono-chloro-di-fluoro-methane contains only one chlorine and two fluorine atoms. However, the shape is that of methane; there is still one atom unaccounted for. Since methane started with four hydrogens, the remaining atom is hydrogen. The formula is $CHClF_2$.

It is becoming more and more important to be able to recognize these refrigerants from their chemical names, because the same refrigerant is being supplied by more than one manufacturer under different trade names. For example, any refrigerant supplied by the Carrier Corp. is called "Carrene". A refrigerant supplied by the General Chemical Div. of the Allied Chemical and Dye Corp. is called "Genetron". Various "Carrenes" or "Genetrons" are given different numbers to distinguish them.

Identity In Numbers

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TABLE 3 — CHLOROFORM BASE COMPOUNDS AND THEIR PHYSICAL PROPERTIES

Trade Name	Formula	Chemical Name	Boil Temp	Press at 5°	Press at 86°	Freeze Temp
	$CHCl_3$	Chloroform	140°			
Freon 21	$CHCl_2F$	Di-chloro-mono-fluoro-methane	48°	19.2"	16	−211
Freon 22 Genetron 141	$CHClF_2$	Mono-chloro-di-fluoro-methane	− 41°	28	160	−256

icals Div., E. I. du Pont de Nemours and Co. They have a numbering system which describes their compounds as follows:

Any two-digit number is a methane.

Any three-digit number is an ethane.

The last digit gives the number of fluorine atoms.

The next to the last digit *is one more* than the number of hydrogen atoms.

Thus, "Freon-12" is a methane because 12 contains two digits. The last digit, 2, tells us there are two fluorines (see Fig. 3). The first digit, 1, tells us there is no hydrogen. Then remembering there must be four atoms beside the carbon nucleus, there are two still unaccounted for. They are chlorine because all Freons contain chlorine or fluorine, or both. Thus, "F-12" is CCl_2F_2, and it would be called di-chloro-di-fluoro-methane.

"Freon-22" would be a methane with two fluorines (see also Fig. 3). The first digit, 2, indicates one hydrogen. The unlisted atom is still chlorine. Thus, "F-22" is designated $CHClF_2$, and its name is mono-chloro-di-fluoro-methane.

Since these halogenated hydrocarbon refrigerants are all called "safe" refrigerants, it is of importance to inquire, "how safe is safe?". The toxic properties of those with proprietary names are low. The Underwriters' Laboratories, Inc. classes them from Group 4 (2½ percent concentration for one hour causes some physiological effect) to Group 6 (20 percent, for two hours). This means the engineer could go into an engine room with anything from a bad leak to a broken gauge glass without discomfort or danger.

Non-Toxic Use Hazards

It should be remembered that these refrigerants are not air, and we must have air to live. A leak in a cold room with only one door, if undiscovered, might push all the air out of the room. Such a room would be unsafe to enter. These gases are all heavy. A leak could displace the air in a tank, hold of a ship, or similar space open only at the top. However, any unsafe concentration should be recognizable by its odor.

Another hazard of the halogenated hydrocarbons is that they will break down in the presence of flame or hot surfaces, to form highly toxic compounds. Thus, welding or other torch operations should not be done in the presence of a bad leak or heavy purging. These toxic compounds are highly irritating, so they give their own warning.

One of the chief objections of the ammonia man to these newer refrigerants is that "you can't hold them". The entire refrigerant charge is often lost due to leaks. Actually, these refrigerants are no harder to hold than ammonia. More ammonia than "safe" refrigerant will leak through a given crack or orifice in identical systems. But a few parts per million of ammonia in the air warns the operator that he has a leak. Too often he waits for the same indication to warn of a leak with other refrigerants. Yet, he knows these new refrigerants are almost odorless.

Leaks are found with a halide torch, a "Prestolite" or alcohol burner which directs a flame against a copper ring. In normal atmosphere the burner shows a blue flame, but in the presence of any halide, this flame turns green. An exploring tube on the torch is held to any joint to be tested. A color change of the flame indicates refrigerant at that point. In the average installation, a monthly test should disclose any leaks, and they can be corrected.

Adverse Effects of Moisture

Another difference between the halogenated hydrocarbons and ammonia is their reaction with water. Water in these new refrigerants has two harmful effects on the system. The most immediate effect is for the water to separate out as a plug of ice at the expansion valve. Di-caloro-di-fluoro-methane is the worst in this respect. A few parts per million is enough to plug the system, and the colder the evaporator, the less is the moisture tolerance. Improper purging or evacuation procedures whenever any part of the system is opened, can admit much more than this critical amount of moisture from the atmosphere. Even compressor oil used must be kept in a closed container to prevent the absorption of moisture from the air.

A second effect of water is corrosion. The water will hydrolyze these refrigerants to produce traces of hydrochloric and hydrofluoric acids which will attack all metal parts of the system. This action is slower than the icing up of the expansion valve, but more insidious in that it does more damage to the equipment without giving immediate warning.

The reduction of these moisture problems is done in two ways; prevention and cure. To prevent moisture trouble, keep the system as clean as possible at all times. Proper evacuation and purging are of utmost importance. Anything introduced into the system must be thoroughly dry. The cure for moisture, as well as a factor of safety in any system, is a drier or dehydrator. This is a cartridge of silica gel, activated alumina, or similar water absorbent, which is usually placed in the liquid line. The substances used have a higher affinity for water than for the refrigerant, and so absorb the water from the refrigerant.

Oil Affinity Noted

The reaction with oil is also different with these refrigerants, than with ammonia. First, they all dissolve in oil in varying amounts. This thins the oil. This effect can be corrected by using a heavier oil. As mentioned above, the oil must be dry. Many ice machine oils which are satisfactory for ammonia are entirely unsuitable for these new re-

TABLE 4 — PROPERTIES OF THE ETHANE FORM HALOGENATED REFRIGERANTS

Trade Name	Formula	Chemical Name	Boil Temp	Press at 5°	Press at 86°	Freeze Temp
	C_2H_6	Ethane	−127°	221	661	−278°
Freon 111	C_2Cl_5F	Penta-chloro-mono-fluoro-ethane	279°			
Freon 112	$C_2Cl_4F_2$	Tetra-chloro-di-fluoro-ethane	199°			
Carrene 3 Freon 113	$C_2Cl_3F_3$	Tri-chloro-tri-fluoro-ethane	118°	27.9"	13.9"	− 31
Freon 114	$C_2Cl_2F_4$	Di-chloro-tetra-fluoro-ethane	38°	16.1"	22	−137
Freon 115	C_2ClF_5	Mono-chloro-penta-fluoro-methane	− 28°			

frigerants. Equipment manufacturers recommendations should be followed.

Most halogenated hydrocarbon refrigerants will mix with oil in any proportion. Secondly, they are heavier than oil, so the oil will tend to rise to the top of any enclosure. This makes oil draining from the bottom of the receiver and evaporator impossible. In all units with these refrigerants, some oil is expected to circulate throughout the system. Evaporators must be operated sufficiently flooded to wash this oil to the suction line. Suction lines are chosen so gas velocities will blow the oil back to the compressor. A separator in the compressor manifold drains the oil back to the crankcase. It is important to remember that any starving of an evaporator will allow oil to collect. This raises evaporator temperatures for the same suction pressure, and may drain sufficient oil from the crankcase to cause compressor damage.

Small systems used on kitchen or bar equipment usually do not have oil separators. Large systems do, but here is another difference from ammonia practice. A float valve in the separator automatically drains the oil back to the compressor crankcase. However, there is one more complication. During off cycles when this oil separator cools to room temperature, some refrigerant may condense here, and also drain back to the crankcase. To reduce this, these oil separators are usually insulated to hold their heat as long as possible. Some manufacturers are now providing thermostatically controlled heaters in crankcase or separator to "boil-off" refrigerant.

Low Compression Temperatures

A minor difference which sometimes surprises ammonia men is the low compression temperatures found with these new refrigerants. They all run lower than ammonia; low enough that water jacketing is unnecessary. Di-chloro-di-fluoro-methane ("Genetron-12" or "Freon-12") is the lowest on the list. The head temperature will run from 100 F to 150 F with this refrigerant, depending on the operating conditions.

No description of the halogenated hydrocarbon refrigerants would be complete without bringing out their influence on centrifugal compression equipment. With tri-chloro-mono-fluoro-methane ("Carrene-2", or "Freon-11"), by operating at a vacuum in the evaporator but approximately atmospheric pressure in the condenser, it is possible to get the high side and the low side of the system within 15 psi of each other. A two-stage centrifugal compressor is designed to do this.

Centrifugal compressors handle such enormous amounts of vapor that they are not designed for small equipment. If 400 to 1800 tons of refrigeration is wanted in one package, the centrifugal compressor is the only choice available. It is doing to the refrigeration field approximately the same thing the steam turbine has done to the reciprocating steam engine. The turbine has not entirely replaced the reciprocating steam engine, but wherever larger amounts of power are needed than can be easily obtained with a reciprocating engine, turbines are used.

Chemists have given refrigerating engineers an entirely new list of substances with boiling temperatures from approximately 200 below to 200 F above zero. Many of these substances make excellent refrigerants if applied right. The wide range of boiling points makes it possible to find a substance suitable for many different applications. No one refrigerant will ever be found to fit all possible applications. So the choice of equipment and its refrigerant will depend on which properties are most important for a particular job. After the choice is made, the operator should get as familiar as possible with the particular refrigerant so he can get the most out of it under all operating conditions encountered.

(For proper refrigerant applications, see next month's article)

Fifty Year Men of Industry Educational Conference Guests

FIFTY year men of the refrigeration industry located in the area will be guests of honor at the coming Midwest Regional Educational Conference, NAPRE, to be held in Chicago at the Congress Hotel, April 30 and May 1. These engineers are to be singled out by the chairman of the conference and presented to delegates and guests at a dinner in their honor Saturday night, April 30. An NAPRE Honorary Membership will be presented to Geo. B. Bright of Detroit, an active member of NAPRE for over 33 years.

The conference is the first attempt of this nature since before World War II, according to Bert C. McKenna, chairman. Ten chapters and members-at-large in the 12 state area around Chicago have arranged to participate in the affair. McKenna is a national vice-president of NAPRE, past president of San Francisco chapter, and just recently completed two terms as president of Chicago chapter, which group is acting as host to the Midwest Conference. Advance registration and reception for out-of-town guests will take place Friday evening, April 29. Chicago chapter members and regional committeemen will welcome arrivals at an informal gathering.

Conference Program Outlined

The program gets under way early Saturday morning. The welcome address follows registration, with several engineering papers to be presented before noon. In the afternoon two more educational talks will be presented. Among the topics are liquid recirculation in a large Wisconsin food freezing plant, practical water conservation, and industrial refrigeration applied to humidity control in pharmaceutical manufacture. Other topics include alterations, remodeling and operating practices in brewery installations, and the refrigeration engineer in modern meat packing plant.

Short field trips to diversified loop refrigeration installations will follow the speaker presentation. According to the committee, there will be ample time for the visitors to return to their hotels in preparation for the dinner.

A Sunday "brunch" which is to develop into a Question and Answer session on operating procedure and practices, is one of the novel features. A panel composed of superintendents and chief engineers from hotels, public buildings, inspection agencies, ice plants, cold storage, public utilities and brewing industries will endeavor to answer questions put by the delegates. Chapters are urged to send perplexing problems.

This session will be followed by a chapter clinic early Sunday afternoon. Chapter problems on educational programs, membership, public relations, attendance, dues collection, and other local headaches are to be discussed.

The ladies have by no means been omitted from the activities. A luncheon has been arranged for them in the English Room at Marshall Field & Company on Saturday, April 30. Following the luncheon, their Chicago Chapter hostesses have offered a varied selection of activities, ranging from sightseeing and shopping expeditions to theatre and cultural pursuits.

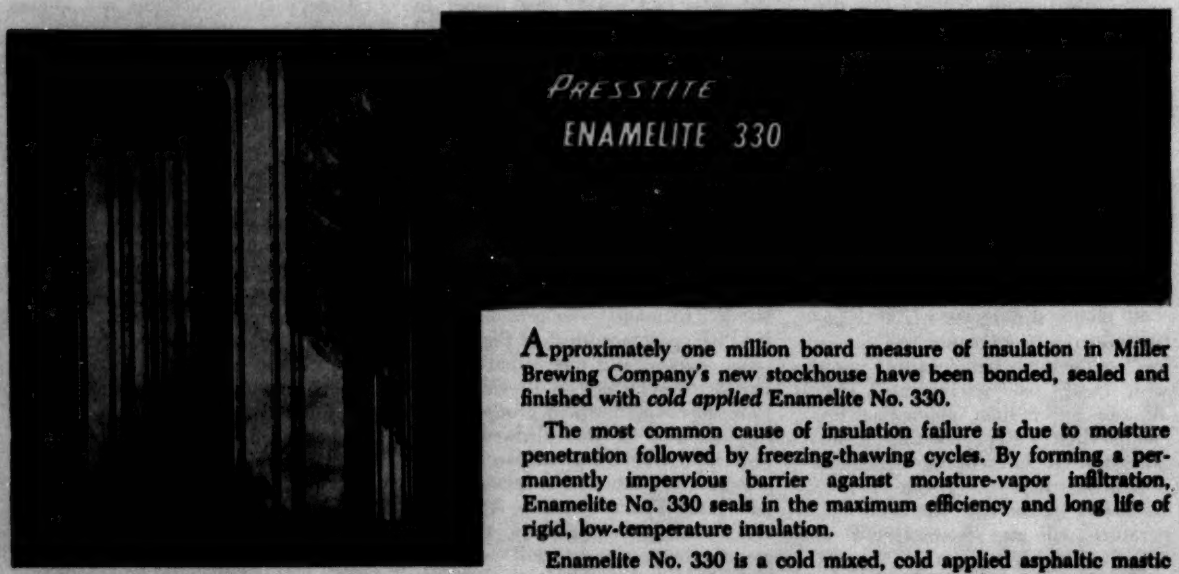
Vivien Presents Charter At Greater Dade County Florida

ANOTHER chapter, Greater Dade County, (Miami Beach) Florida, has been added to the growing list of NAPRE units. On Thursday, February 24, at the Kenilworth hotel, Miami Beach, Florida, Leo J. Vivien, NAPRE's past president, initiated 25 new members and presented a charter to this newest group. He installed the following officers as the first official slate at Miami Beach: President, Ted. T. Hoover, chief engineer, The Bal Harbour Hotel, Miami Beach's newest; Vice-president, Walter J. Smith, assistant chief engineer, Biltmore Terrace Hotel; Secretary-Treasurer, Charles W. Moneypenny, chief engineer, Kenilworth Hotel, and Sgt.-at-Arms, Charles M. Haller, chief engineer, Plantation Cold Storage Co.

Chartering of this chapter grew out of the membership drive within the hotel industry in 1954. John N. Mariakis, chief engineer, Claybourne Towers Apartment Hotel (Sheraton Corporation), New Orleans, helped

NAPRE past president Leo J. Vivien presenting Ted T. Hoover, president of Greater Dade County chapter with their charter, while Charles W. Moneypenny, chapter secretary-treasurer, looks on.

Speaker's table at the charter presentation, Greater Dade County, Miami Beach Florida, February 24. Left to right: Messrs. and Mesdames Herbert M. Dunn, O. O. Roth, James H. Crum, Ted T. Hoover, Leo J. Vivien, C. W. Moneypenny, Roy Proctor, and Justin Anderson.



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the Miami group get started with their first meeting. They were encouraged by NAPRE past president, Erich B. Utescher, superintendent engineer of the Kirkeby Hotels. The first engineer to sign as an active member was Anthony J. Ruane, chief engineer, Algiers Hotel, Miami Beach.

Although the list of officers for the new chapter appears to be predominantly hotel men, a great many other industries are represented, including cold storage, fruit juice concentration, ice manufacturing, and dairying firms. Assisting Leo Vivien, the presiding deputy at the chartering ceremonies, was James M. Crum, sales manager, Water Conditioners, Inc., and Herbert M. Dunn, chief engineer, Parman-Kendall Corp. The affair was held at the Kenilworth Hotel.

In addressing members of the new chapter who were present at the dinner with their wives, Vivien declared that the Greater Dade County chapter could be a star in the NAPRE family. "You have within your membership, engineers of experience and knowledge, willing to impart this experience to its other members. Your beautiful city abounds with refrigerating and air conditioning installations, and your potential for membership is great," he said. "You will find that the friends you make through this association will be steadfast and NAPRE men will be in demand in Miami and the surrounding area."

The presiding officer continued, "You men had the courage and will to form this chapter, you must carry the burden of making it grow. Constant work is necessary, more members must be obtained and personal differences must be overlooked. Chapters around our great country are watching the Miami chapter. I say here tonight, that the other chapters had better look to their laurels."

Los Angeles Convention Program Shapes Up

EDUCATION features of the program for NAPRE's 46th Annual Meeting to be held in Los Angeles November 8-10, were announced recently by Regis Gubser, National President. Dean Harold P. Hayes, California Polytechnic College, San Luis Obispo, will have active charge of the speaker arrangements. Hayes is Chairman, NAPRE National Educational Committee. Details at Los Angeles will be handled by Guy R. King, Vice-chairman, NAPRE's Educational Committee.

Erection, operating or practical maintenance talks on industrial refrigeration equipment will be the principal objectives. Some lectures will cover air conditioning and other refrigeration applications in public buildings, institutions and hotel operations. Other topics include cold storage and pre-cooling of consumer food commodities, including discussion of the latest development in vacuum processing.

On the social side, Los Angeles chapter, the host, has already announced scheduling of golf tournaments for the early arriving delegates, and the members who choose a late departure from the convention scene. The chapter is also publicizing the opportunity afforded members to visit new large industrial refrigeration plants in the area. One feature of this publicity is the recent construction completed by three of the nation's larger brewing firms in the San Fernando Valley. Schlitz, Pabst and Anheuser-Busch have all recently located modern large capacity breweries there.

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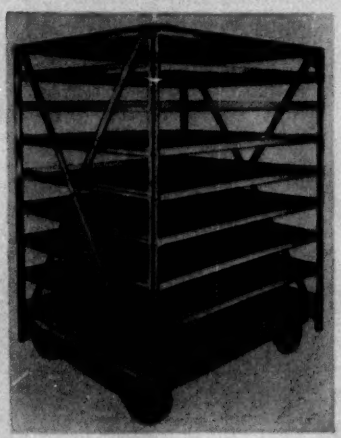

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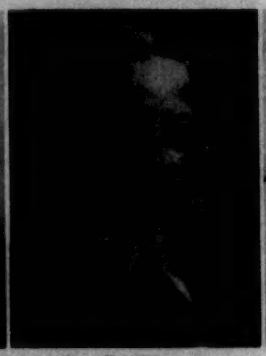
From the President's Desk

NAPRE Executive Cites Honorary Members

HONORARY memberships in NAPRE are quite a distinction. Few members have held them. In the 45 years of NAPRE history, there are hardly enough of this class of members from which to form a good sized chapter. Today only five engineers are held in such respect by the membership, with a sixth to be added on April 30.

John W. Neff



Jay R. Watson

Charles A. Conley

Dean of honorary members is John W. Neff, awarded at St. Louis in 1946. John started his refrigeration career with Washington Brewing Company, Columbus, Ohio. He graduated from Siebel Institute of Technology, Chicago, in 1910. He has since held chief engineer positions in Chicago and suburbs; is now with Central Cold Storage Company, South Water Plant, Chicago. A charter member of the Chicago chapter NAPRE, Neff served as its secretary from 1920-27. He was a member of National Education Committee, 1923-24, a Director, 1927-32, when he became president.

Charles A. Conley was elected honorary member at the 45th Annual Convention in New Orleans. Backbone of Tennessee Chapter No. 1, Conley has been its secretary for 41 years. He was National President in 1938. He started his refrigeration career in 1905 with an ice manufacturing firm. He became chief engineer of Memphis Cold Storage & Warehouse Co. in 1907, and chief engineer of their second plant, Mid-South Refrigerated Warehouse Co., in 1953. Charley is treasurer, Local 92 IUOE, and 25 years on the City Board of Engineering Examiners.

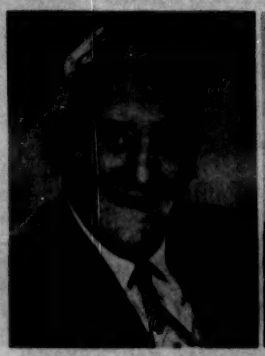
Jay R. Watson entered the refrigeration field from the University of Michigan with an electrical engineering degree. From test and engineering services with Westinghouse at Pittsburgh, Pa., and Stamford, Conn., Watson moved to sales and district manager for Electric Machinery Co., Chicago, in 1922. Shortly thereafter he became district manager for Ideal Electric & Manufacturing Co., Chicago, which position he has held to date. Jay has 33 years continuous membership in NAPRE, 10 years as secretary of the Chicago chapter. He is a member of ASRE, and for 50 years a member of AIEE.

Like Watson and Conley, the New Orleans convention also awarded an honorary membership to Burt C. White. White is a charter member of Michigan Chapter No. 1. He has been an active member of NAPRE for 33 years and National Director for several. He is a past director of the Detroit Sportsmans Congress. Burt was an erection engineer with several Detroit firms. For 24 years he was chief engineer of U. S. Warehouse Co. He retired there in 1952, entering real estate business with his sons. He credits NAPRE and night school for his training.

Voted an honorary membership at New Orleans, 1954, was H. T. McDermott, President, Nickerson & Collins Company, Chicago. Mr. McDermott has been a member of Chicago Chapter NAPRE since 1938. Succeeding the late, J. F. Nickerson in 1944, he has consistently advanced the interests of NAPRE. He has been a member of the Refrigeration Service Engineers Society since 1933 and a member of ASRE since 1941.

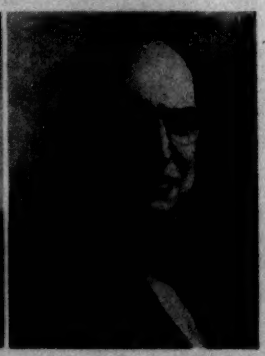
NAPRE'S Board of Directors will add another honorary member to this exemplary group on April 30. On that date, at the Midwest Regional Educational Conference, Chicago, George B. Bright will be awarded an honorary membership. Geo. Bright started his refrigeration career in 1897, operating a small ice plant. After erection experiences from 1904 to 1912 in Chicago, and sales management experiences in Detroit to 1915, he organized the Detroit Ice Machine Co. in 1916, his own consulting firm in 1917.

The newest honorary member holds numerous patents and is active with many engineering groups. He is past president and life member, ASRE, a charter member of Michigan Chapter No. 1, NAPRE, a member of Detroit Engineering Society, Michigan Society of Professional Engineers, represented NAPRE with ASA and has been a member of Board of Rules, Safety Engineering, Detroit, since 1924. Asked about his education, Bright relates that he got it the hard way, pursuing self-education and practical experience.



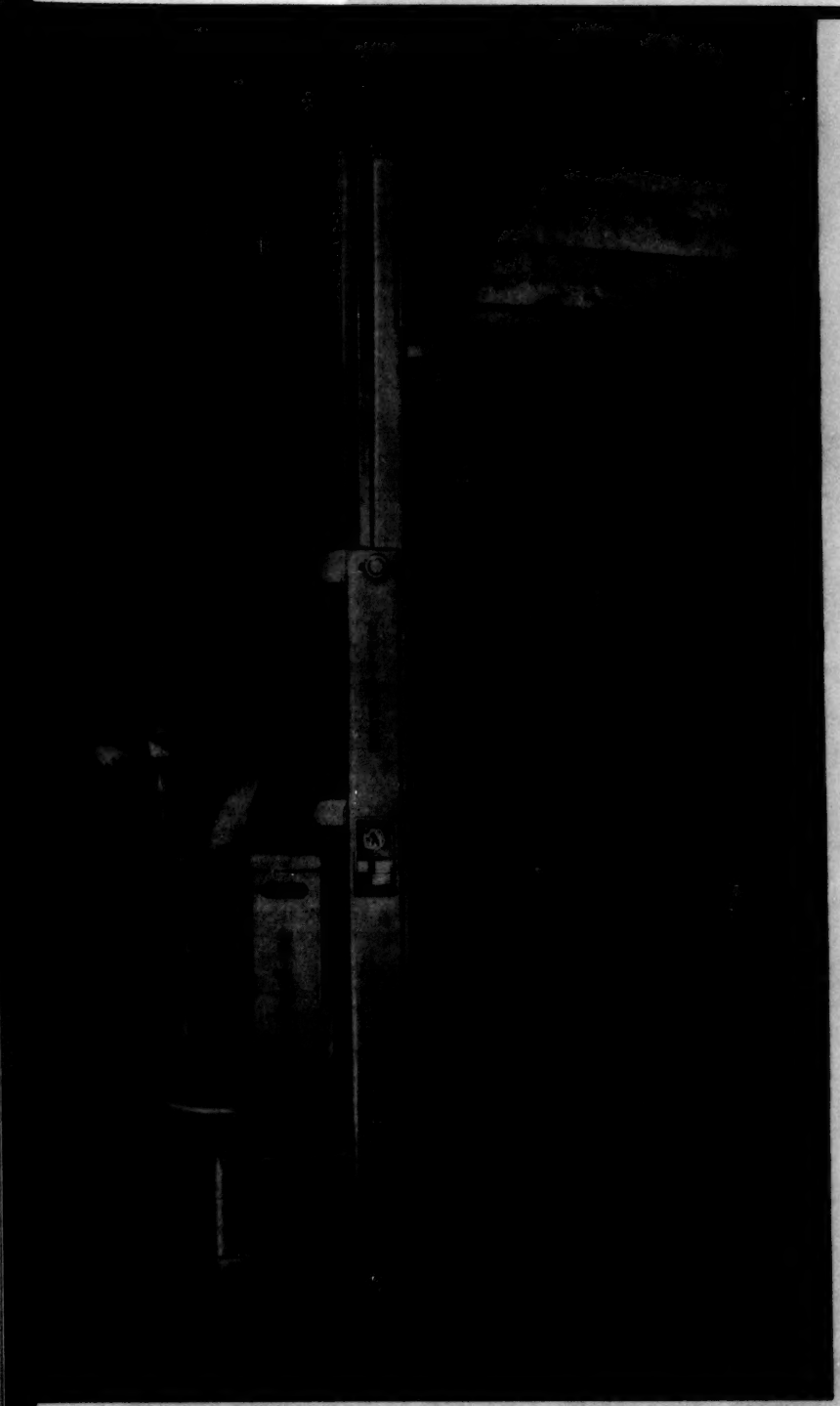
Burt C. White

H. T. McDermott



Geo. B. Bright

Regis Gerber



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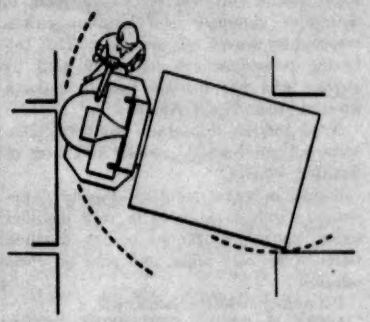

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Question Box

The National Educational Committee, NAPRE, answers monthly in this column, operating problems forwarded by members. The Committee appreciates answers from the field. Address questions and answers to Prof. Harold P. Hayes, Dean of Engineering, State Polytechnic College, San Luis Obispo, Calif.

Brine Inhibitor Test

QUESTION NO. 1042. How do you test for chromate concentration in brine?—C.B., Seattle.

ANSWER NO. 1: As stated on page 40 of the manual "Calcium Chloride for Refrigeration Brine", there is no simple test which the average refrigerating plant operator can make to check up on the concentration of the chrome corrosion inhibitor in his brine. A sample should be submitted to a chemical laboratory for analysis about once a year.—W. R., Washington, D. C.

ANSWER NO. 2: You have to have some simple chemical testing facilities to determine chromate concentration with a reasonable degree of accuracy. The following procedure can be easily used by anyone who has learned how to make a titration test. These reagents are needed:

N/40 sodium thiosulfate solution. (Dissolve 6.2 gm $Na_2S_2O_3 \cdot 5H_2O$ in 1 liter of distilled water.)

Starch indicator solution. (Grind 2 gm potato starch to a paste in cold distilled water, pour into 200 ml boiling distilled water, settle over night, and pour off clear solution.)

Potassium iodide crystals, KI.

1:1 hydrochloric acid solution, HCl. (Dilute concentrated hydrochloric acid with an equal volume of distilled water.)

This is the procedure:

Measure a 25 ml sample of the brine into a test flask.

Acidify with 1:1 HCl. The color will change slightly, from yellow to amber.

Add a few small crystals of KI. The color will change to a brownish iodine color, light to dark, depending on the chromate concentration.

Titrate with N/40 thiosulfate solution to a light yellow color.

Add 1 or 2 ml starch indicator solution. The color will change to blue.

Complete the titration to disappearance of the blue color.

Read the burette and note the amount of thiosulfate solution used.

Multiply the number of ml thiosulfate solution by 33. The result is the chromate concentration in terms of parts per million CrO_4.

It isn't too important to know the chromate concentration exactly. If the pH value is around 7.5 to 8.0, any chromate concentration above 100 ppm will give good protection. This condition will impart a distinct yellow color which is a fair indication of protection. However, if there is any sediment in the brine it is necessary to filter a sample, or allow the sediment to settle out completely in order to get a reliable gage of the color.—K.M. H., St. Louis, Missouri.

System Description Asked On Hot Gas Defrosting.

QUESTION NO. 1043. A thermobank was briefly described in December Industrial Refrigeration article on Spreckles-Russell Dairy, Page 17, center column. Apparently this is a hot gas defrost system for blower type coils. How does it work? Are any simple diagrams available?—T.K., Edwardsville, Ill.

ANSWER: The "Thermobank" automatic defrost cycle is a type of hot gas defrost system which uses heat stored during normal operation of the system, to defrost the coil during the defrost cycle.

A tank or accumulator installed in the suction line is immersed in an anti-freeze solution in which a coil of the discharge pipe is also immersed. During normal operation heat is added to the solution from the discharge gas on its way to the condenser. Suction gas passes through the top portion of the accumulator, where very little heat can be added to it.

On the defrost cycle a solenoid valve is opened which permits the flow of discharge gas into the evaporator from a point between the thermal expansion valve and the coil. The condensed liquid is returned to the compressor through the suction line by way of the accumulator where the liquid drops to the bottom and is evaporated by heat absorbed from the anti-freeze solution.

The "Thermobank" cycle is completely automatic. A time clock opens the solenoid valve in the defrosting line and stops the evaporator fan motor at predetermined time intervals. The time clock is interlocked to run only during the time the compressor is operated. By this means the number of defrost cycles in a given day will depend on the loading of the refrigerator.

The defrost cycle lasts for approximately six minutes and permits not more than 3 to 4 degrees temperature rise in a heavily loaded space, according to the manufacturer. Wiring and piping diagrams of the Thermobank are available from the Kramer Trenton Company, Trenton, New Jersey, in their bulletin number 16-R.—D. L. San Luis Obispo, Calif.

Electric Starter Selection

QUESTION NO. 1044. We would like to have an unbiased opinion of this problem. The question is on a 150 horsepower motor, 440 voltage, 60 cycles; which is the best type of starter for this motor—(1) across the line starter, or (2) manual immersed oil auto transformer type starter? What are the advantages of the specific one you would choose?—R.G., Kansas.

ANSWER: I am assuming that the motor to which you refer is a squirrel-cage induction motor. In terms of initial cost, you can buy a full voltage starter for about 20% less than a reduced voltage starter. However, in all probability your local electric power company will have the final say in the matter. For example, the full voltage starter will require a starting current of over 1000 amperes while the reduced voltage auto transformer will require about 700 amperes on the 80% tap and about 460 amperes at the 65% tap. From the power company point of view, the starting current demand is very important. It may be that the transformer equipment in your vicinity may be too small to handle full voltage starts

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of such magnitude or the power company's network control system may be such as to prohibit them. In any event, the best procedure is to check first with the local power company. If it does not have any regulations one way or the other, let cost be the governing factor in your decision. Your cost figures must include any economic factors which may enter beyond initial cost, such as your own plant transformer capacity, etc.—H. P. Hayes.

Seeks Information Source On Filter Efficiencies

QUESTION NO. 1045. What percent efficiency are metal filters compared to glass fiber filters for industrial air conditioning units. I understand that the metal filters are about 65% efficient, and that the dust will seep through and settle on the coils and into the duct work. M.C., Metairie, La.

ANSWER: No statement can be made concerning the relative arrestance of viscous coated metal filters and viscous coated glass fiber filters. Filters designs are too variable. Generally either type of viscous filter when clean has an arrestance above 70% *when tested by the ASHAE Test Code.* Both the resistance and the arrestance increases as the filter becomes dirty. There is little danger of accumulation of dust on coils or in ducts with either because of the small particle size of the dust (usually less than 5.0 micron diameter) which is allowed to pass.—N. S., San Luis Obispo. Calif.

Effect of CaCl + NH_3 On Stainless Steels

QUESTION NO. 1046. What effect does calcium brine with a small amount of ammonia in it have on stainless steel?—C.B., Seattle.

ANSWER: Any undesirable amount of ammonia in the Calcium chloride brine will tend to increase the alkalinity of the brine and may soon permit formation of ammonium chloride which tends to increase corrosion, even after the brine may have been treated to bring it back to a slightly alkaline condition. Therefore I believe that the stainless steel might corrode more readily with a small amount of ammonia in the brine.

In general, it is possible to use calcium chloride brine with stainless steel equipment without any noticeable corrosion when the brine solutions are kept on the alkaline side (pH about 8 to 10) and an inhibitor is used. If the metal surface is not kept clean, corrosion may occur. At no time should brines be allowed to remain on stainless steel and concentrate by evaporation.—W. R., Washington, D. C.

Anhydrous NH_3 Fertilizer

QUESTION NO. 1047. Is there any difference between ammonia which is used for refrigeration and that which is used for fertilizer?—J.N., Superior.

ANSWER: In general, Anhydrous Ammonia is available in two grades:

1. Commercial grade, containing 99.50% NH_3

2. Refrigeration grade, containing a minimum of 99.98% NH_3

In the production of refrigeration grade Anhydrous Ammonia particular care is taken to hold to minimum the percent of noncondensible gases and nonvolatile substances which might tend to interfere with the efficient operation of refrigeration equipment. The material used for direct application to the soil is commercial grade which has a slightly higher content of the nonvolatile residues and noncondensible gases mentioned above.

Because of the additional processing required to produce refrigeration grade ammonia, this product is priced higher than commercial grade ammonia.—R. T., Baltimore, Md.

Change Frequency, Re-use of Electro-static Filter Oils

QUESTION NO. 1048. How often should electro-static (AAF) filter oil be changed? Can it be centrifuged and reused?—E. K., Chicago.

ANSWER: The sludge which settles to the bottom of the oil reservoir should be removed when it has reached a depth of two or three inches. Ordinarily only sufficient oil needs to be added to replace that which has been removed with the sludge. Generally purification of the oil is not required. If lint is encountered it is well to reduce the lint on the precipitator by the use of lint screens.—N. S., San Luis Obispo, Calif.

New Questions

Reducing Delivery Pressures In High Velocity Air System

QUESTION NO. 1049: Describe how 5-inch static pressure is reduced to 1½-inch static pressure at delivery in high velocity air conditioning systems.—E. McM., Chicago, Ill.

Queries Operating Practice With Unit Air Condensers

QUESTION NO. 1050: The article, "Air Cooled Condensers Cut Down on Costs of Maintaining Cooling Towers", in the January issue of Industrial Refrigeration has raised a point which needs clarification. The article states that the head pressures never went below 100 pounds during the past winter, although outside temperatures were as low as 15 F. I know they are small units but I have had a lot of experience in this and winter pressures should be very much lower if he used water. We all know that the closer the evaporator and condenser pressures are together, the less power required per ton of refrigeration. Were the summer pressures unusually high?—M.J., Baltimore, Md.

Large Temperature Rise With Freeze Tunnel Water Defrost

QUESTION NO. 1051: Would it be too much trouble to ask you for some information on defrosting units. We use water defrost, and during the running season we have to defrost once or twice a day. Each time we

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defrost, it brings the temperature up 30 to 40 degrees warmer in the tunnel and we lose too much time in pulling the tunnel down again to 30 to 40 degrees below zero. Could you recommend some other way of defrosting? —W.G., Canada.

Proper Solder Selection

QUESTION NO. 1052: A leaky joint has developed in a 2-⅛ inch bypass from a Hubbell capacity control off our "Freon" compressor. Fire regulations at utility firm for which I work won't allow large enough torch tips to attain silver-solder heat range. Will 95-5 solder hold? Or will oxidation cause the joint to give out in a short time?—S.M., Chicago, Ill.

Oil Slugging Problems

QUESTION NO. 1053: With low pressure refrigerants, will oil slugging from the system occur mostly with a cold compressor — say with start-up? Will excessive oil slugging bend or warp a shaft?—A.D., Chicago, Ill.

News Notes and Chapter Activities

New Orleans

MAX SOFER

MARDI GRAS in New Orleans with all its social activities brought cancellation of the second meeting for February. However, it is all over now and we can settle down to some serious work again. At our first meeting in February, President M. D. Mancuso appointed the various chapter committee chairmen and presented them with their assistants. Following our usual refrigeration course lecture, Marion Olivier, Educational Chairman, offered a technicolor film "Steel, Man's Servant". Many of us saw, for the first time, iron ore converted into steel, and the huge machinery necessary for manufacturing such items as rails, armor plate, etc.

At this same meeting the topics of the next National Convention to be held in Los Angeles were discussed. More experienced convention attendants summed up answers to the type of clothing worn in California at the particular time of the year the convention is to be held as follows: It was suggested to be on the safe side the delegate should carry along a straw hat, a fur coat, and by no means forget a ribbon tie, if possible a polka-dotted one. The latter article is a must, since it is not only stylish but by actual test has proven to draw the attention of waitresses in restaurants, thus assuring quick and delightful service.

Colton

HARRY BONTER

AT THE California chapter No. 5 meeting, February 9, at the Santa Fe Ice Plant lunchroom, San Bernardino, the members were very much pleased to welcome back as a reinstated old time member of the chapter, Arthur S. Chantry, owner of the Victorville Ice Co. May he not stray away from us again.

After the regular business routine, the entire time was given to instructor Frank J. Scherer for his class lecture and answers to specific questions from the floor. One answer was mostly given to blackboard sketches and figures on a mechanical device for filling paper bags with crushed ice at the National Ice Plant at Riverside, of which Scherer is chief engineer. The device was made at the plant under Scherer's design. When the bags fill to the correct weight, the ice is shut off by an electrical trip contact. Various other discussions were brought up and worked out by the members.

In the regular notice, members were asked to bring a question or problem to be worked out at the meeting, which makes it very interesting and educational for all present. The meeting closed with the usual lunch.

Newly elected officers, Louisiana Chapter No. 2, New Orleans: Left to right, sitting: C. Bosse, Pan American Southern Corp.; F. Gillio, chief engineer, Marks Isaacs Co.; J. Arena, chief engineer, Welien's Music House; H. Mancuso, chief engineer, New Orleans Grain and Fuel Co.; L. Vivien, Jr. Past National President, secretary of the New Orleans Engineers Examining Board; D. Fischer, chief engineer, Hausmann's Inc.; M. Sofer, chief engineer, Chrysler Corp.; Standing: G. Viegas, sales engineer, Reilly-Benton Company; W. Williams, chief engineer, New Orleans Butchers Abbotoir; G. Whitman, partner, Whitman, Holloway and Oliver; J. McConnon, engineer, Communications Building; John Mariakis, chief engineer, Claybourne Towers; E. Orth, engineer, Gardners & Shippers Ice Manufacturing Co.; M. Oliver, partner, W-H-O.; J. Vernaci, engineer, and F. Chase, chief engineer, Hibernia National Bank Building; and T. O'Connor, chief engineer, Orpheum Theatre.

Green Bay

JIM SCHOUTEN

BOOSTER compressors, and in particular rotary machines, for multi-stage refrigeration systems was the subject of presentation by Don Parkhurst, chief engineer and sales manager, Burge Ice Machine Company of Chicago, at our meeting on February 16. The speaker went into detail on the engineering and design features, pointing out economic and mechanical use of this equipment in low temperature operations, covering savings in maintenance costs and improvement of temperature control.

Mr. Parkhurst was accompanied by Roy Espy, engineer for Burge who had previously became acquainted with the chapter on the occasion of the Green Bay charter presentation last year. Both gentlemen answered questions from the floor concerning this type of equipment. They had been introduced by Charles Culbert, a charter member of this chapter, their representative in Northern Wisconsin.

This meeting was presided over by President Lambert Bodart. The committee working on the chapter by-laws under the direction of past President Lester Winkler, reported progress. The committee headed by Myron Miller, Al Petcka and Jim Schouten, reported on new meeting room facilities at the VFW Hall.

Seattle

JOHN GRAINTER

THIS is not so much a chapter report, but rather a reply to a question asked by the National Secretary regarding Washington Chapter No. 1, and its economic aptitude. We hope it inspires other small chapters. The National officers seem surprised by our financial set-up. After national per capitas are paid, this chapter seems to manage well with the revenue we have left.

How, you wonder? Well, we have *little* overhead. We meet at the local YMCA. Our chapter is able to meet there since we do perform a service of providing "technical education", and our meetings are open to the public. Our speakers are gratis. Although they often come from some distance we do not pay transportation. We do treat to dinner, should we have one scheduled that evening.

Our chapter instructor provides his services at no expense. The secretary-treasurer does receive a small annual fee to meet his expenses. The chapter owns its own typewriter and mimeograph machine, so there are no printing bills. The costs of stencils and correspondence is not too great. That is all there is to it. Perhaps Seattle is not considered socially ambitious but we have excellent educational material for the benefit of our members, and that is what we are looking for.

Detroit

LEO GAGE

THE February 24 meeting of the Detroit Chapter was in the form of a visitation trip to Hudson's Northland Shopping Center, which is located in a suburb of Detroit and is said to be the largest of its kind in the United States. This project was the subject of a splendid feature article in the January issue of INDUSTRIAL REFRIGERATION. The nucleus of the project is a large store operated by the J. L. Hudson Co., which is surrounded by 80 other stores of all descriptions (see page 13, January, 1955 issue I.R.).

More than 150 members and guests attended. The group enjoyed a fine prime rib of beef dinner, which was served in the main restaurant of the J. L. Hudson Co. After dinner, a short meeting was held in the Hudson store auditorium. Time was taken out to initiate seven new members.

Amateur Leo Gage found audience at Northland Center trip too big to photograph in one group. Composite above shows members and guests meeting in the J. L. Hudson Co. auditorium before the tour.

Lloyd Braford, engineer at Hudson's poses before one of the large electric panels in the Northland power house. Members inspect hermetics at Hudson cafeteria (the condensing water for these units is from the main chilled water circulating system.) Control panel mounting meters, humidity and temperature regulating instruments for "Weathermaster" units, is closely inspected. Bill Euth is the member with topcoat on his arm. A good start is made on the roast beef dinner served in the J. L. Hudson Company restaurant at Northland prior to the meeting and inspection trip.

Lloyd Braford, who has charge of air conditioning and refrigeration in the Hudson store proper, gave a description of the equipment that would be seen in that section. Charles Rouse, chief engineer, Northland Center project, then briefed the group on the equipment that would be seen in the power house, and its general operation. Under the guidance of Mr. Braford, the tour started off with an inspection of the fan room and equipment which pro-

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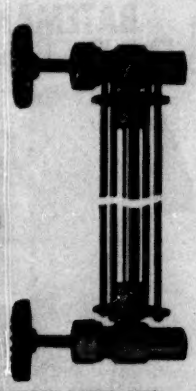

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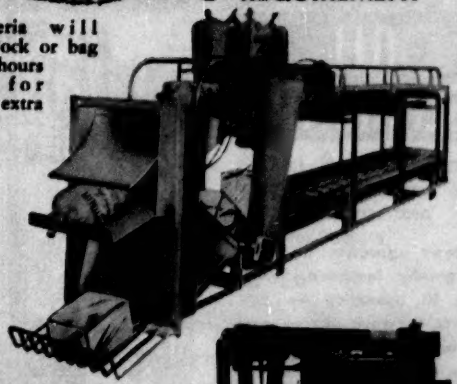

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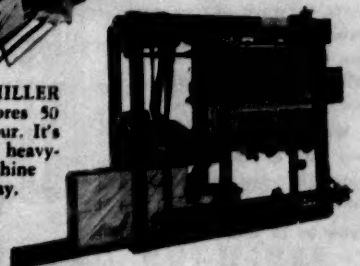

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Chas. Heemstra, president Michigan chapter poses before one 1000-hp motor of 1800 ton Carrier chilling unit at Northland, Detroit. At the right, chief engineer Chas. W. Rouse (shirt sleeves) caught by the photographer as he describes operations to a group of visitors.

vides air conditioning throughout the Hudson building, as well as compressors and other facilities which provide refrigeration for the store restaurants and other departments.

This was followed by an inspection of the large power plant, under the direction of Charles Rouse. The power plant is located at the north end of the project, some distance away from the store buildings. A tour of the machinery room revealed many unique features of operation. Outstanding, of course, were the four 900-ton compressors with 1000 HP motors, two for each 1800 ton chiller, circulating water pumps, three 100 HP high pressure boilers and numerous automatic controls. Mr. Rouse explained in detail the operation of each item. He further explained the method of supplying chilled water to the various tenants from this system, which is measured by new dual type meters, with the therm as the unit of measurement.

Memphis

CHAS. CONLEY

FEBRUARY brought good turn-outs for both meetings. On February 2, our guest speaker was O. A. Howard, manager, Memphis District, Armstrong Cork Company. He showed colored slides and talked on finishes for insulated surfaces, mouldable insulations for low temperature fittings, foamed plastic pipe insulation. Howard went into detail, explained the picture he was showing, how these new materials were applied, and where they could and could not be used. The pictures and talk are worth any chapter's time seeing.

On February 16, our own member, Johnie H. Robinson, chief engineer, West Tennessee Tuberculosis Hospital, showed two reels of colored motion pictures of experimental operations being performed on dogs for the purpose of doctors getting experience and results for operations on human hearts and lungs. There were surgeons from all over the world here recently, watching Memphis heart specialists doing the operating.

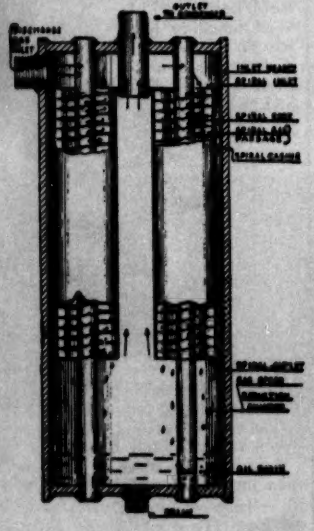
The dogs were packed in crushed ice and a recording thermometer was inserted into the animals' vitals. When their bodies reached a temperature of 31 C they were given an anesthetic. Then the operation would start. The heart and lungs could be seen working while the operation was going on. There were dogs up, running around playing, that had been operated on and whose hearts had quit beating for 3 to 4 hours. This illustrated how doctors were doing every thing they could devise to bring back to life or extend it. Ice plays a big part in it.

Instructor H. L. Todd talked on ice making. He explained the history of ice making, the various ways it is being made, and concluded with remarks on the numerous automatic small quantity producing units available today. On March 2, the Chapter's instructor explained how Dry Ice is made from CO_2. He showed on the blackboard the cycle of manufacturing. Also talked on was altitude; the effect it has on automatic expansion valves and such.

Raymond E. Law, chief engineer, Nat Buring Packing Co.; Scott Holloway, Executive vice-president, Malcolm Builders, Inc., and Alfred M. Collins, Missouri Pacific Railroad, were elected to member-

"King Zeero"

OIL SEPARATOR



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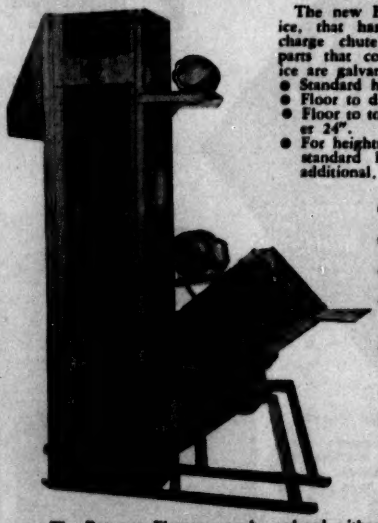

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- Standard height 7' 6".
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FEATURES:

- V-belt drive from motor to gear box.
- Gears are enclosed and run in grease.
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The Bateman Elevator can be ordered without crusher, as the Bateman Elevator will work with any crusher.

Price of Elevator, less motor $450.00

Elevator with Monarch Crusher, less motor $695.00

Monarch Crusher takes a one H.P. motor.

(Motors at prevailing prices.)

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MINERAL WELLS, TEXAS

ship. Members also took this opportunitly to congratulate and joke with John A. Rollow. His daughter recently made the public press as "Miss Southwestern". John is engineer at Southwestern College, Memphis, where students of this school honored his daughter, who incidentally has lived her life on that very campus.

Los Angeles

FRED HERR

FUTURE Outlook for Mechanical Refrigerator Cars was the topic of one featured panelist at the March 2 meeting, Los Angeles Chapter. Victor A. Stubblefield, assistant plant manager, Pacific Fruit Express, a member, reviewed this presentation. His was one of three on the Chapter's annual program featuring digests of outstanding engineering articles.

Others who read articles of their choice were Robert S. Ohling, Independent Refrigeration Co., on "Fire Hazards", and Thomas O. Russell, Kohlenberger Engineering Corp., Fullerton, Calif., on "Solar Energy for Comfort". Each speaker submitted to questioning from the floor at the conclusion of his phase of the program.

President Elmer A. Johnson called the business session to order and presented to Frank Eccleston, 1954 president, a table model clock radio, in appreciation of his competent chapter leadership.

The applications of six men were approved and they were inducted by President Johnson. They are Charles B. Richie, Holmes & Narver; William L. Bragg, Pacific Fruit Express; L. W. Dobbins, United Electric & Refrigeration Co.; William A. Foster, Union Ice Co.; R. C. Henka, U. S. Rollers & Shippers; and Kenneth A. Calvert, Chase Industries.

Membership Chairman Frank G. Muzzy announced that some valuable packaged food prizes had been obtained for distribution to those taking a leading role in the business of obtaining new members. National President Regis Guber announced the recent chartering of Dade County (Miami) Florida Chapter with 24 members. He also reported on a recent trip to Sacramento and San Francisco. Prospects were favorable, he reported, for reactivating the NAPRE chapter in Sacramento. San Francisco, Gubser revealed, is showing renewed enthusiasm and promises to rank as one of the most active in the national organization.

Victor A. Stubblefield was appointed chairman of the Los Angeles Chapter Golf Committee. He will supervise arrangements for the Fourth annual tournament to be held Sunday, May 1, at the Montebello Golf and Country Club, Montebello, Calif., and for the tournament to be held in connection with the national convention in November. The March 2 preliminary class was conducted by George Paulick, the subject "Refrigeration Lines and Pressure Drops" (Chapter 22, Basic Refrigeration).

Despite a heavy rain, 200 members and guests participated in a visit to the new Anheuser-Busch brewery in San Fernando Valley on the night of February 16. Headed by Chapter President Elmer A. Johnson, the NAPRE group was guided through the vast "Budweiser" Westcoast plant by chief engineer Bert Schwartz. They were given an opportunity to inspect close-hand the modern refrigeration and cooling setups. The brewery management served as hosts in the Rathskeller.

Dallas

HAROLD A. KOUTNIK

AT OUR second meeting in January, William Graham, Pres., Dallas Chapter, appointed Tom Weatherford to head the Educational Committee, F. B. Riek, Jr., as head of Publications Committee, J. Ed. Lawrence, Membership Committee, and James V. Glover, Public Relations. L. P. Reiss, well-known Dallas engineer and member, lectured on accumulators for cold storage plants.

First meeting in February was addressed by Elliott R. Hallowell, who discussed the first chapter of Guy R. King's Refrigeration course. Following the regular meeting, the members were treated to a Dutch supper. The second meeting in February was dispensed with to give the members of the chapter an opportunity to take a tour to the magnificent new Republic Bank Building, Dallas, and its air conditioning plant.

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Chicago

BILL O'REILLY

QUIZ NITE at Chicago February 8 for our preliminary class was conducted by Dick Zach, York Corp. It was a four question written quiz on chapter No. 8. A general discussion of the chapter followed. Nick Downes, vice-president and chapter program chairman, presented Art. J. Devitt of the Zintel-Devitt Company, who in turn introduced C. Milton Wilson, sales manager, Anemostat Corp. of America. Wilson gave a very interesting talk, illustrated by slides covering "The Distribution of High Velocity Air". Geo. Zintel, senior partner of the Zintel-Devitt Co., and President, Illinois Chapter, ASHAE, was also a guest at this meeting.

Members learned from the guest speaker's discussion the advantages of employing high-velocity air. Duct sizes are reduced in the same lineal relation as though velocity was increased. Also, as quantity is reduced for equal sensible cooling, the fan horsepower is decreased and filter size is reduced. The return air system is decreased in direct proportion to the temperature differential increase.

Disadvantages were also discussed. They are:

1—The horsepower per ton of refrigeration is increased as the suction pressure is decreased. Savings can be made of course, if the peak loads are handled by high temperature differential air and by reducing the differentials when the peaks are passed.

2—There is no increase in the latent load from the occupied spaces as dew point is lowered, but of course, the latent load from the outdoor air supply is increased. Engineers are nullifying this disadvantage by using chemical dehumidifiers on the outdoor air supply.

3—The relative humidity in the occupied space is lower, but some engineers are designing for a higher ambient to produce an effective temperature still well within the limits of the comfort zone.

A small attenuator-diffuser unit was available for close inspection by members.

On February 22, Dick Zach was again the instructor for our preliminary class. Questions on Chapter No. 9 were answered in a general discussion. Dick drew diagrams on the blackboard in order to explain valve functions a little clearer. Winners on the previous written quizes were given their awards: 1st place went to Stanley Mann, 2nd to Alex Duffy, and 3rd place to Nick Downes. All three winners are from the Illinois Bell Telephone Company. A fiberglas fishing rod went to the top man, with expendable portraits of George Washington to the others.

Nick Downes, program chairman, introduced a panel of experts who presided at the Question Box session. They were Bert McKenna, Central Cold Storage Co., Dick Kelahan, National Secretary, Gene Rytlewski, York Corp., and Nick Downes. Questions will have to be a lot tougher at the next session because those asked didn't stump the experts at all. They answered every question that was put before them. A resolution and petition for George B. Bright, Sr., to be made a National Honorary Member was read and approved by a unanimous ballot.

Members-at-Large

BERT MCKENNA

ONE failing of this column seems to have been the proper welcome of new members. It is hoped that this month we can make up for all slips since last November. First we welcome James J. Guise with Sicks Prince Albert Brewery, Sask., Canada. A hand shake of welcome goes to John E. Duquette, operating engineer, Bay City Freezer, Bay City, Mich. M. A. Florida, engineer, Safeway Commissary, Denver, is one of our newer members. Marcus is proving to be an energetic fellow. He has volunteered for the task of organizing a Denver chapter. Congratulations, Marcus, and best wishes for your endevaor.

Since Indianapolis has not as yet received its charter, I suppose new members in that vicinity are technically members-at-large. There are quite a number of them that have been signed up recently by Tony Wochna and secretary-treasurer (pro tem) Frank Behning. These new members are Walter J. Myers, William H. Madison, Orval Snowden, Raymond L. North and Ed Brethman, all with Indiana Terminal Refrigerating Company. Then we have John D. Keenan, Jr., G & E Refrigeration Service; Arthur B. Kinney and Roy I. Peterson, with Veterans Administration Hospital; and J. W. Ludewig, Mundet Cork Corp. Other new members in Indianapolis are Ben Paller, consultant; Robert H. Breier and Lewis M. Grabhorn with Roland M. Cotton Company.

Two reinstatements in recent months have been Quaid Minich with Inland Cold Storage Company, Kansas City. Incidentally, Quaid has been active with our National treasurer, Leland Kenagy, in reorganizing the Kansas City chapter. Carl J. Hyder of Omaha, Nebr. is also a recent reinstatement.

Looking over the list of recent remittances, it appears that some of our other members-at-large might be able to take a cue from Marcus Florida, Tony Wochna and Leland Kenagy, and start some chapter activity in their own communities. Florida will probably call on E. L. Green and A. J. Casey of La Junta, H. C. Diehl and William J. Hoover, Colorado Springs; J. Bruce Espy and Russell Seibert, Estes Park, all in Colorado, for help with his new chapter in Denver. Dean Emerson, Jr., has already enlisted the assistance of Larry Banta and W. W. Roberds at Houston. They had a mighty fine chapter in Houston at one time. These boys are striving to rebuild it.

NAPRE Chapters to Receive Basic Refrigeration Manual

FIRST chapters of the Instructor's Manual for use with Basic Refrigeration will be in the hands of all chapter secretaries by April 1, it was announced by Dean Harold P. Hayes, Chairman NAPRE National Education Committee. Guy R. King, author of Basic Refrigeration, the official NAPRE text, and Vice-chairman of the Education Committee, is also author of the new Instructors' Manual. The Manual will be distributed through the chapter secretaires for Chapter files, the chapter Education Chairman or Program Director and, of course, all instructors.

Guy R. King, author of NAPRE's new instruction manual for Basic Refrigeration, the official text.

The new Manual contains a five-part introduction, covering instructions and pointers for instructors in handling NAPRE classes. In addition to its objective of assistance to the chapter education staff, it provides all chapters with the opportunity of presenting the text in a similar manner. As members complete the course they know that their class coverage has been equal to all other chapters and that they are then as well qualified to obtain the certificate of proficiency as any other member.

Enos Walter Alderman

ENOS WALTER ALDERMAN, honorary life member, Los Angeles Chapter, NAPRE, passed away at Van Nuys Retreat Sanitorium, Van Nuys, Calif., March 7, age 82. Masonic services were held March 11 in the chapel of Forest Lawn Memorial Cemetery, Glendale, Calif., NAPRE National President, Regis Gubser, Herbert Royden and Earl Rogers were among the pallbearers. Before his retirement in 1951, Mr. Alderman was west coast representative for several nationally known refrigeration equipment manufacturers. He joined NAPRE in Pittsburgh in 1921.

Record Crowd of Warehousemen Expected to Meet in Chicago April 12-16

REFRIGERATED and merchandise warehousemen from across the nation, about 850, are expected to attend the American Warehousemen's Association 64th Annual Meeting at the Edgewater Beach Hotel, Chicago, April 12-16. Meeting jointly will be AWA's two divisions, the National Association of Refrigerated Warehouses and the AWA Merchandise Division.

E. G. Erickson, Chicago, convention chairman, reported late last month that 600 reservations had already been received with more coming in every day. "AWA's 64th Annual Meeting is shaping up to be one of the best, and most profitable on record, with interest running high," he said.

CLEM D. JOHNSTON
President Chamber of Commerce United States

Featured speakers at the meeting will include Clem D. Johnston, president, Chamber of Commerce of the United States and past president of AWA, and Dr. Allen Stockdale, a member of the staff of the National Association of Manufacturers and popularly known as the "dean of speakers" among America's platform specialists.

Mr. Johnston will speak at the AWA "Man of the Year" Luncheon on Wednesday, April 13 and Dr. Stockdale will speak at the NARW First Timers Breakfast on the same day.

NARW Sessions

NARW sessions open on Wednesday morning at 9:30 a. m. in the East Lounge. After the corporation business, safety awards will be presented to those qualifying NARW member plants who have completed one year without a lost-time industrial accident. Following this will be reports from the Cold Storage Research Advisory Committee, the Cold Storage Industry Advisory Committee and the Nominating Committee. In the afternoon, The Refrigeration Research Foundation will sponsor an insulation session.

An All-Industry session, sponsored by AWA's Merchandise Division, on "How You Can Cut Costs While Improving Service and Accuracy" will lead off on Thursday morning at 9:30 a. m. Emphasis will be on office machines and equipment, new procedures and techniques of operation.

Panels will dominate NARW sessions on Thursday afternoon—covering problems of small plants; engine room operations, legislative activities and a report on business conditions in the various NARW Chapters. Following these will be the election of NARW Executive Committeemen.

Another All-Industry session, sponsored by NARW and featuring "ideas" for cutting costs and increasing warehouse efficiency through better materials handling techniques, will start off Friday morning at 9:00 a.m. John Mock, nationally known and a dynamic discussion leader, will be the moderator.

NARW sessions Friday afternoon will feature an Executive Forum, moderated by Mr. Mock, and with special emphasis on the economic outlook, sales, labor relations and research. Following this will be a "Bringing Up Management" session —a discussion of training programs and methods for junior management personnel.

Installation of NARW officers will take place at NARW's closing session on Saturday morning. Immediately following the divisional sessions will be the AWA closing session, with the installation of AWA officers.

Exhibits

Exhibits will be shown at the convention by the following:

V. C. Patterson & Associates, York, Pa.

Field Engr. Products Co., Jamestown, N.Y.

Freezing Equipment Sales, Inc., York, Pa.

Great American Industries, Rubatex Division, Bedford, Va.

York Corporation, York, Pa.

The King Co., Owatonna, Minnesota.

Arctic Feather & Down Co. Weather-All Insulated Products Div., Bloomfield, N.J.

Refrigeration Engineering, Inc. Los Angeles, Calif.

Carrier Corporation, Syracuse, N.Y.

Fred Ophuls & Assoc., New York, N.Y.

Owens Corning Fiberglas Corp., Toledo, Ohio.

Lewis-Shepard Products, Watertown, Mass.

J. H. H. Voss Co., New York, N.Y.

Armstrong Cork Co, Lancaster, Pa.

Clark Door Company, Newark, N.J.

Refrigeration Research Foundation Annual Meeting

THE ANNUAL meeting of the Refrigeration Research Foundation will be held in connection with the annual AWA — NARW convention at the Edgewater Beach Hotel, Chicago, Tuesday afternoon April 12, opening at 2:00 p.m. Reports will be presented on the activities of 1954 and the financial position of the Foundation, also current program objectives will be considered. After election of the new Industry Board members, the entire Board of Directors, including members representing the public interest, will meet for the annual board dinner at 6:30 p.m. at which time the new Executive Committee and officers will be elected. The latter will meet for the first time at a time and place to be announced later.

All members of the Foundation are urged to be present. Members of the Industry Advisory Council, formed in 1954, are especially urged to be present so that they may become acquainted firsthand with the various programs of the Foundation, especially its current research investments. The discussions in the general meeting will have definite value for all warehousemen, covering achievements and the ever-widening influence of the Foundation on associated and customer industries and on the public.

Port of Seattle Orders Cold Storage Survey

SEATTLE Port Commissioners have ordered an independent survey of Port cold storage problems. Refrigeration engineer Frank W. Knowles was hired to report on Spokane St. and Bell St. terminal cold storage operations, which have shown a loss of more than $75,000 so far this year.

Warehouse-Frozen Foods Industries Discuss Mutual Needs

A LUNCHEON was sponsored by the National Association of Refrigerated Warehouses for frozen food distributors and packers during the National Frozen Foods Convention at the Conrad Hilton Hotel, March 14. Guest speakers were John M. Fox, president of Minute Maid Corporation and Sam H. Vogel of Vogel's Inc.

Introducing the speakers, William Dalton, executive vice-president, said such meetings as this were valuable because they offered refrigerated warehousemen an opportunity of meeting their frozen food customers. This relationship, although by and large mutually satisfactory, had resulted in problems and in the future there will be even greater problems on the part of the refrigerated warehousing industry and they will also be increasingly concerned as to how to provide the best possible service.

One requirement, he said, has been constantly colder temperatures. During the past few years, for instance, freezer space has doubled and prospects are that there will be a constantly increasing demand for more freezer space. The inter-relationship between frozen foods and refrigerated warehouses was never more notable than at the present time. The future looks bright and common-sense care and constantly improving business practices will continue to effect a steady and healthy growth on the part of both of these twentieth century industries, he concluded.

DuPont's Success

In his prepared address Mr. Vogel complimented the warehousemen for the fine job they had done. This is particularly commendable he said, because of the vast amount of frozen food items they are required to handle. He then proceeded to give a paraphrase of a talk given by James Q. DuPont of the DuPont Company, which he offered as a fundamental foundation for a successful business. The points covered by Mr. DuPont he then enumerated as follows:

Fill in need. Know-how. Meet competition, not through price but through service. Improve. Thrift and economy. Have additional capital when needed. Plow earnings back into the business. Diversify and decentralize. Owner management. Personal attention to business. Take care of complaints immediately. Make the business better and make it safer. Most important is the right treatment of people.

These Mr. Vogel said are the reasons why DuPont has been a successful company over some 150 years and all of these principles apply to the warehousing and to the frozen foods industry.

Mr. Fox said that a good share of the credit for the success of the frozen food industry should go to the refrigerated warehouses for the fine job they have done. He then proceeded to tell what he thought the packer has a right to expect from the warehousemen and vice versa.

The packers have a right to expect: Adequate protection of goods in storage so they will arrive at the consumers in their original quality and to do this requires proper attention in the warehouse all along the line. When removing goods from the warehouse, the warehousmen should be especially careful not to leave old goods remaining in storage while removing later goods, the rule in this connection being, first in, first out.

He said that warehouses operated under definite rules and these rules should be followed and understood by warehouse employees. Carelessness, he said, sometimes resulted in shipping goods that had been impounded because of low grade and this can be extremely embarrassing and damaging. The packer has a right to expect prompt and cheerful service and he usually gets it. He has a right to expect that costs be kept moderate and this he suggested can be accomplished by simplifying the storage procedure.

As to what the warehouseman has a right to expect from the packer, he suggested, the following: Adequate pay for service rendered and prompt payment. Complete and accurate advance information on products coming into storage. Containers of the right shape and size to afford efficient handling.

Mr. Fox concluded with the suggestion that there is a trend in the frozen food industry toward building their own storage facilities at point of production, but, he said, warehouses will continue to be the nerve center of frozen food distribution in central distribution centers and the normal expectation would be that this service must become more and more efficient and more and more designed to meet all the needs of the frozen food industry.

Frozen Foods Uses More Freezer Space

OVER 275 million cubic feet of freezer space, for storage of the steadily increasing volume of frozen foods, is expected to be in operation in the public refrigerated warehouse industry by the end of 1955, according to M. W. Young, president, National Association of Refrigerated Warehouses. In Chicago for the National Frozen Food Convention, Mr. Young emphasized the tremendous growth experienced by the public refrigerated warehouse industry in the past 15 years.

"Since 1939," he said, "freezer space capacity has more than doubled, rising from 108 million cubic feet in 1939 to the projected NARW estimate of 275 million cubic feet by the end of 1955. This is an increase of 167 million cubic feet and represents over 75 percent of all freezer storage space in the nation".

Total space capacity, both cooler and freezer, in the public refrigerated warehouse industry is expected to be over 480 million cubic feet by the end of 1955, Mr. Young added.

Book Reviews

MAGNETIC CONTROL OF INDUSTRIAL MOTORS, second edition, by Gerhart W. Heumann. Published by John Wiley & Sons, New York. 714 pages. Illustrated. Price $9.50. For sale by Nickerson & Collins Co. Chicago, Ill.

From small beginnings, the industrial control industry has grown to respectable size. Behind the motors supplying power for industrial production, stands the control equipment, recognized as an essential partner, directing the performance of the motor and affording protection to the operator. The aim of this book is to explain performance of motors, characteristics of control devices, and the function of commonly used control circuits.

The many recent changes in the design of control components and systems is recognized in this second edition. Expanded by about twenty percent, it includes much new material on adjustable voltage and regulating systems, particularly with regard to rotating and magnetic amplifiers and obsolete controller designs, have been eliminated. From a practical viewpoint, it is designed to make possible a selection, quickly and accurately, of the proper type of controller for a given application.

Canadian Ice Association Mid-Winter Conference

A MID-WINTER conference of the Canadian Association of Ice Industries was held at Burlington, Ontario, February 17, with a good attendance and an interesting program.

Following up discussion at the last annual convention of a universal sign for the Canadian ice industry, such a sign was presented and approved. Designed by Tek Plastics, Ltd., it is 6 ft. x 4 ft. and is made principally of mould plexiglass. The design is quite similar to that used by the City Products Corporation in the United States, with a yellow background and the three letters 'ICE' in white, shaded with red. The signs can be made in a job lot for the Association and sales will be made by the Association to individual companies.

A general discussion on price structure was held. It was generally agreed that prices in certain areas of Canada are much too low compared with other merchandise offered for sale, when present day operating costs are considered. Some of the members indicated they had been selling Ice cubes through retail stores by supplying a freezer cabinet, but agreed that they had not worked at this particular phase of the business too hard and felt that if given the proper attention, it could be developed into a money making market.

Allan Fairhead spoke on the marketing of punch bowls and carvings and stated that while the market was not an extensive one for this type of ice, it was a very lucrative one and that customers in general are quite willing to pay a good price for a specially designed punch bowl or carving. He advised members who were not at present in this luxury ice business to get into it and to be sure to charge adequately for their merchandise.

The meeting agreed to standardize on three sizes of paper bags — 100 cube, ½ bushel and bushel. It was pointed out that the Association would be able to buy bags in larger quantities and thereby offer them at a lower price to members of the Association.

A general discussion was held on rates charged for cold storage and freezer rentals and many members indicated an interest in remodeling their buildings to participate in this expanding field.

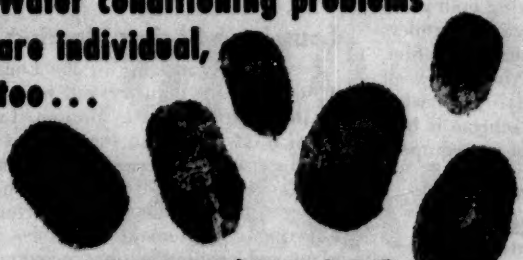
Mountain States Annual Convention

A CONFERENCE and convention of the Mountain States Association of Ice Industries will be held at the Brown Palace Hotel, Denver, Colo., April 21 — 23. The program will start Sunday evening with a social and cocktail party. Monday an all-day regional conference of the National Association of Ice Industries will be held culminating Monday evening with the annual Mountain States dinner. The Mountain States annual convention will be held in an all day session Tuesday.

Iced Tea Posters Ready

THROUGH a joint promotional program with the Tea Council, the National Association of Ice Industries is offering members beautiful four-color tea posters, furnished by the Council. The posters are 20½ x 30½ inches, just right for use on trucks, vending stations, hot boxes, poster boards, and any number of places where the public will see them, says "Ice News" of the National Association of Ice Industries.

Water conditioning problems are individual, too...



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New Ideas in the Processing of Poultry And Their Impact on Packaging

Highlights of a panel discussion of cooling and freezing of poultry, at Institute of American Poultry Industries' Fact Finding Conference.

DR. GEORGE F. STEWART
University of California

A REVOLUTION has taken place in poultry processing in the past 15 years, almost without our realizing it. Warm evisceration, subscalding, ice chilling and ice packing have become almost universal; attractive, printed, moisture-proof packages for all frozen and much of our fresh chilled pack are commonplace. Where do we go from here? I'll hazard a guess or two.

Brine spray has been proposed again, this time for chilling and freezing packaged, eviscerated chickens and turkeys. According to University of Massachusetts workers, brine chilling can be done very rapidly: with brine at 20° F. it takes only six minutes immersion for broilers, 35 minutes for 12 pound hen turkeys and 45 minutes for 25 pound toms. This method has one distinct competitive disadvantage: there is no moisture pickup.

Chilling Eviscerated Carcasses

At the University of California we have tackled the chilling problem from a different angle. We have been using high flow-rate, chilled water to see if we can reduce the time to a point where on-the-line chilling of eviscerated carcasses would be practical. We have chilled broilers and fryers to 45° F. or lower in 15 to 30 minutes, turkeys in one to two hours. Engineering studies are being made to see if this method would be economical for broilers and fryers. It may be for turkeys if the Stericooler type of unit can be utilized, in which case the birds would have to be removed from the line, put through the cooler, then returned to the line for further processing. The moisture pick-up is about the same as with slush-ice.

Since almost all turkeys are now eviscerated and subscalded, practically everyone has gone to a minus 30 to minus 40 F. air blast to preserve good appearance. Whether brine (sprays or immersion) as recommended by the Massachusetts group will be used extensively is not certain at this time. I would guess the complexity and inconvenience will greatly limit its use.

Subscalding has made moisture-proof packaging a must for turkeys. Transparency printability, form-fitting and toughness, particularly at low temperatures, are important too. The latter two have been hard to achieve, but manufacturers of Cryovac and polyethylene appear to be on the threshold of solving both problems equally well. For chilled broilers and fryers, cellophane, Pliofilm, Cryovac and polyethylene are all being used extensively. Just what package or packaging scheme is best for these birds is not yet agreed upon.

Subscalding Turkeys

A. A. KLOSE.
U.S. Dept. of Agriculture

The customary appearance of turkeys, a light, creamy skin, has been modified over the past five years by a trend to subscalded birds, which are inherently darker, and a trend to marketing turkeys with less finish. Increasing the freezing rate does lighten the appearance of these otherwise darker appearing birds. Size, finish, initial temperature, air temperature, air velocity and amount and type of packaging and boxing affect the freezing rate and frozen appearance of turkeys.

Our studies at the Western Utilization Branch show that in a 6-month, relatively well finished turkey the fatty layer under the skin provides a pronounced insulating effect, and smaller birds with less skin insulation freeze appreciably faster. This faster rate, however, does not compensate for the inherently darker initial appearance due to lack of fat in the skin layer of the smaller bird.

The packaging or boxing material has a far greater insulating effect than that of the skin. That is why subscalded and immature turkeys should be frozen in the open tunnel, rather than in the box.

Our data indicate that, for the processing variables studied and in the practical ranges covered, optimum appearance is most critically affected by finish and by freezing in a box, and only moderately affected by variation of air velocity and air temperature in the commercial range.

Louisiana Spring Meeting

A SPRING meeting of the Louisiana Ice industry will be held at the Virginia Hotel, Monroe, La., April 6. It will be in the form of a panel discussion covering modern trends in merchandising ice. Other subjects to be covered will include advertising, automatic controls in plant and vending stations, economic outlook for balance of 1955, cooperative deliveries, and ideas for other businesses.

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North Carolina Ice Convention

THE 46th annual convention of the North Carolina Ice Association was held March 7 and 8 at Durham, N.C. President J. Mark Freelan of Burlington presided.

Papers and discussions during the meeting covered safety, hydro-cooling, vending stations, selling ice through retail stores, and other subjects of current interest to ice plant operators. The National Association was represented by Guy W. Jacobs, executive secretary, and C. P. Austin, director of research and marketing.

George S. Sherrod of Greensboro was Master of Ceremonies at the annual banquet Monday evening and Horace L. Seeley of Raleigh was the speaker of the evening on "Nothing Sells Itself".

Officers were elected as follows:

President, A. J. Brinson, Lumberton.

Vice-President, V. E. Boomer, Rich Square.

Secretary-Treasurer, Lewis H. Powell, Raleigh.

Chairman Executive Committee, J. M. Freeman, Burlington.

Georgia — Southern Ice Elect Officers

AT a joint convention of the Georgia and Southern ice conventions, held February 22-23, the following officers were elected for the Georgia Association.

President, Homer McGowan, Marietta.

Vice-president, R. H. Crossfield, Griffin.

Chairman of Board, W. C. Buck, Columbus.

Southern Ice officers were elected as follows:

President, B. A. Barrosse, Asheville, N. C.

Vice-president, B. W. Franklin, Birmingham, Ala.

Chairman of Board, M. E. Pittman, McRea, Ga.

New Ice Plant

A MODERN 20-ton ice plant has been built at Warren, Maine by the Northeast Ice Company, a new corporation owned by Mr. and Mrs. Maurice Heliof of Camden. Stanley Soboleski will be in charge as manager. York ammonia compressors were installed.

Carrier Official Addresses Chicago Section, ASRE

LOGAN LEWIS, Vice-President, Carrier Corp., addressed the Chicago Section, ASRE, on February 10, on "The Economic Background of Air Conditioning."

The speaker, for background, went into the six eras of air conditioning development. Having brought his audience to modern day applications, he then proceeded to describe the effects of air conditioning on the three "Ms" of industry; men, materials, and machines. He cited examples of applied air conditioning to each "M" in specific applications and various industries.

He was careful to draw the Section's attention to the fact that no cumulative data has been collected which would indicate any economic advantages from these industrial applications. He pointed out that there had been no effort in some cases to obtain data and in others, there was no cooperation on the part of the owners. As a result he concluded, the few observations which had been made could not be generally applied to just any particular industrial group.

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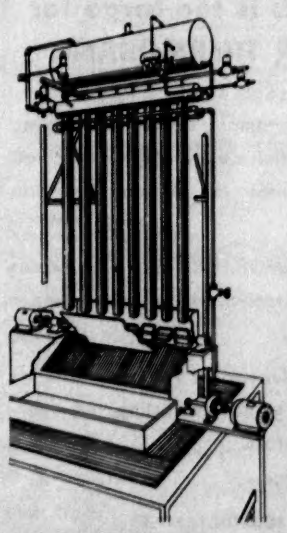

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Ideal for dairies, fisheries, poultry and vegetable packing houses, hotels, institutions, industrial plants, etc. Shell-Ice is frozen on vertical tubes by direct-expansion ammonia or Freon, in thicknesses of 1/8" to 1/2", and is broken by spinners to size desired. No snow, scrapings of water no scale, no cleaning. Shell-Ice is dry and hard, and with average good water is clear. This ice maker is fast, efficient, and automatic. All-steel construction: no delicate parts. Requires very small floor space. Sizes 1/2 to 30 tons capacity. Dozens already in service. Write for Bulletin 54.

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Research Committee Approves Federal-State-Industrial Cooperation

THE Cold Storage Research Advisory Committee, which met at Washington February 14 to 16, in its general recommendations again urged close Federal-State and industrial cooperation in agricultural research. It also re-emphasized the importance to the nation of public information and recommended that publication of the Experiment Station Record and the Journal of Agricultural Research be resumed.

The committee grouped 58 specific recommendations under eight sections. Highlighting them are:

Product Quality and Nutritive Value—(1) Expand the work on the investigation of enzymes occurring in fruit and vegetable tissue and identify the specific constituents upon which they act to cause undesirable changes in quality; (2) to initiate studies involving maintenance of low bacterial numbers on the commercial poultry processing lines by measuring bacterial numbers at key points.

Environmental Requirements—Initiate time-temperature tolerance investigations of fresh fruits and vegetables, to accumulate data to use as a basis for modifying or changing harvesting, handling, storage, and transportation methods; (2) expand studies on time-temperature tolerance and stability of frozen foods.

Container and Package Development—(1) Expand work on the packaging of fresh fruits and vegetables, with particular attention to humidity and the composition of atmosphere within the package and their effect upon storage life and quality; (2) expand present work and, where necessary, intiate new phases of research designed to establish fundamental environmental requirements for frozen fruit, vegetable, poultry, and bakery products in relation to their packaging.

Loss or Spoilage Factors—(1) Initiate research on methods that can render lower grades of meat more desirable (particularly beef), including factors contributing to the tenderness, juiciness, and flavor; (2) expand research on meat bacteriology in relation to keeping quality of meat and meat products.

Equipment and Facilities—(1) Initiate research to establish the optimum air velocity for air-blast freezing, in relation especially to the various sizes of packages which are frozen commercially; (2) expand research on the refrigeration of agricultural commodities in transit to develop refrigeration services that are nearer the requirements of the commodity

New and Improved Frozen Food Products—(1) Develop frozen edible soybean products; (2) expand research on off-flavors and poor texture peculiar to precooked frozen foods or that are accentuated by the freezing and reheating of these cooked foods.

Economic Studies—(1) Make a study to provide "management yardsticks" by which cold storage locker operators could determine break-even points, and develop other information necessary for successful operation; (2) study problems and possibilities of local processing, marketing, and services rendered by locker and other small plants as a method of marketing farm products.

Educational and Other Services—(1) Develop audio-visual materials for use in educational work to show correct use of refrigeration for food in the home and in all marketing channels; (2) develop widest possible use of radio, television, and newspaper articles to acquaint consumers with information on storage temperatures, packaging, buying practices, and rotation of food in home freezers.

Manufacturing Air Conditioning Equipment in India

THE beginning of the manufacturing of light air conditioning equipment in India was made in 1952 by a well-established firm in Bombay. The firm departed from imported ready-made equipment by importing components and assembling them in India. Then it graduated towards the manufacture locally of certain components in its workshop in Bombay, and to that extent it obviated the import of those items and the spending of valuable foreign exchanges. Now, at the end of three years of its progress towards self-sufficiency, it has produced an air conditioner with all its components, except the motor compressor assembly and electrical controls, being made in India, either by the firm or by companies in India. The success that the Bombay firm has achieved is no small tribute to its vast experience in designing and engineering.

To say that the air conditioner imported from America (which has over-produced the item to an extent of 700,000) costs much less than a mostly-Indian unit is certainly a statement of fact, but is equally certainly a short-sighted assertion. The Bombay firm already mentioned, beginning with a modest assembly of 100 units a month, has now already produced 400 excellent Indian air conditioners which as mentioned above carry the motor compressor assembly and electrical controls as the only imported items.

The firm has taken up the question of the manufacture in India of even those two items, and it may not be long before a 100 percent Indian set is offered to the Indian buyers whose purchase of the set in preference to the imported one will aid the firm towards greater production and therefore, a lowering of cost.

Deep freezers, refrigerators and air conditioners are related in their purposes and in a tropical country like India they are a necessity. It may be said that what refrigerators and deep freezers are to food, air conditioning is to the human beings especially in a country like India. Close control of temperature and humidity conditions go towards the greater comfort of operatives, more production and proper storage. In fact, where most regions of India are concerned, air conditioning equipment is a 'must' and the starting of manufacture of air conditioning equipment, which at present is mostly imported is therefore a priority-necessity.

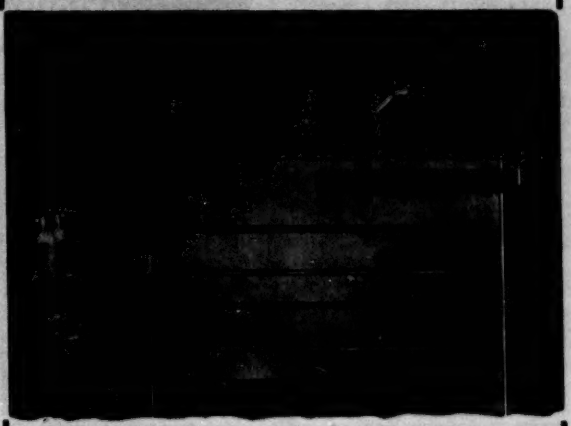
Environmental Equipment Institute Science Section Meeting

THE first annual Science Section Meeting of the Environmental Equipment Institute is scheduled at the Sheraton Hotel in Chicago on April 28, 1955. The full-day program will be of interest to all engaged in environmental simulation and testing.

A representative of the Armed Forces will explain the reasoning behind the government environmental test specifications and answer specific questions regarding interpretation of the specifications. A color film of one of the outstanding governmental environmental test facilities will show how these specifications are met by the armed forces. To complete this picture the engineer in charge of environmental test facilities for an important aircraft manufacturer will describe the advanced work he is carrying on. The afternoon program will include talks on human reactions to environmental extremes, instrumentation for environmental tests, and engineering design of low temperature test chambers. Meeting plans also call for the distribution of advance copies of the first sections of the Handbook of the Environment.

Prevent

COLD ROOM LOSS



with . . .

AIR-LEC DOOR OPERATORS

Air-Lec, shown installed above the cooler door, opens and closes the heaviest doors quickly, safely and smoothly at the touch of a switch or the light pull of a cord. Available with Mechanical Trip for one or two operating stations above each door approach, or with Electrical Switch for more and distant stations. Air-Lecs are in use in thousands of factories, food freezing and storage plants, meat packing companies, garages and service stations.

Speed and Safety are characteristic of Air-Lec because Air-Inertia-Spring, all elastic forces, are the patented forces used.

AIR-LEC FOR TYPICAL COOLER DOOR. . **$65.00**

. . . AND AIR SEAL

Installed at left of door in illustration, the Air Seal operates in conjunction with Air-Lec, to provide an absolute seal on cooler doors. Air Seal crowds the outer edge of the door to stop improper circulation and frosting. Air Seal is especially desirable where temperatures below freezing are maintained.

AIR-SEAL. $25.00

NOTE HOW THEY RE-ORDERED AIR-LECS

	Recently Ordered	Now Enjoy
Dixie Home Stores Greenville, South Carolina	2	14
North East Cold Storage Corp., Portland, Maine	9	15
Stokely Van Camp, Inc., Kent, Washington	1	8
California Consumers Corp., Los Angeles, California	1	6

Fill in and return the coupon today for complete information.

SCHOELKOPF MFG. CO., Madison, Wis.

Cooler Doors are ___ Ft. Wide, ___ Ft. High. Air Pressure ___

Open Toward Warm Side, Cold Side.

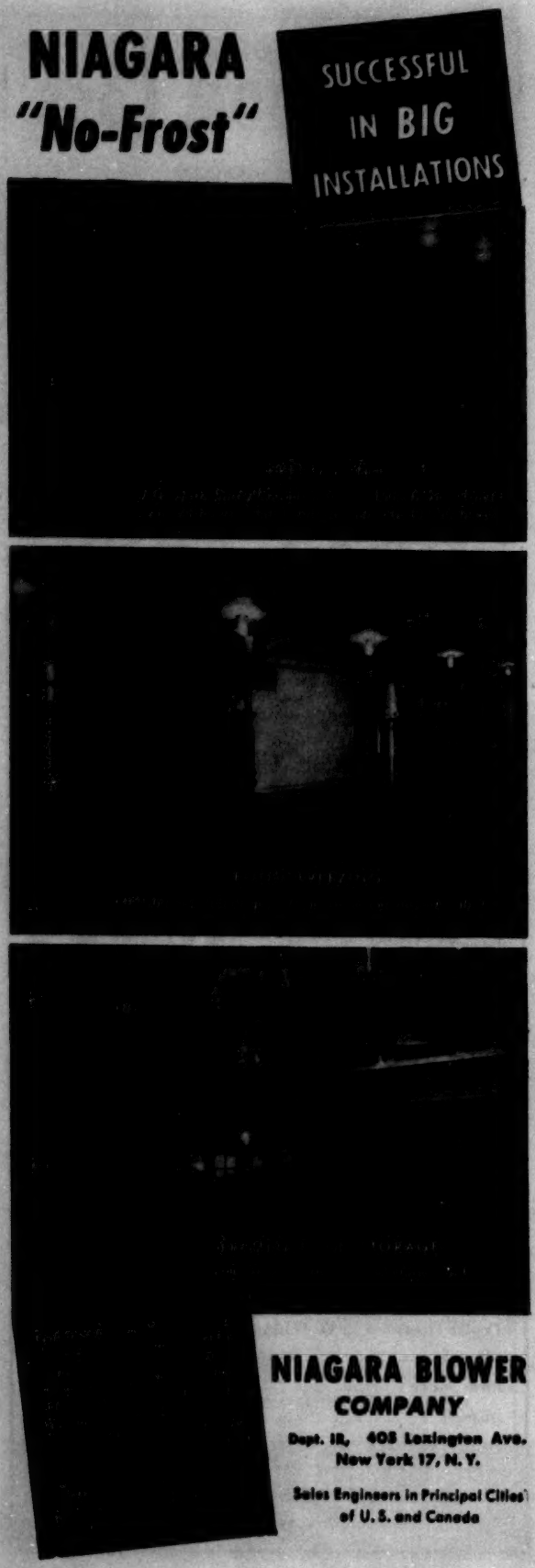
Firm Name _____

Address _____

By _____

SCHOELKOPF MANUFACTURING CO.

312 N. THIRD ST., MADISON 4, WIS.



Big Crop of Turkeys Indicated

ANOTHER big crop of heavy type turkeys is indicated for 1955, the U. S. Department of Agriculture has announced. Since the prices received for turkeys in 1954 were generally unsatisfactory to turkey growers, the Department urges that producers reconsider their production plans for 1955.

On January 1, about five percent more heavy breed turkey hens were being kept on farms for breeding purposes than on that date last year. During January, 11 percent more breed hens were tested for inclusion in laying flocks than in January 1954. Although more breeder hens were probably sold in January and February than last year, the egg-laying potential of birds remaining on farms is high.

Turkey breeders have reported to the Department that more flocks than usual are being allowed to come into production naturally rather than being forced by artificial lighting. This indicates a late hatch. The egg-laying capacity of turkey hens also has increased in recent years. Department officers said that the potentially large supply of hatching eggs could be the basis for a crop of heavy breed turkeys even larger than the 1954 output.

According to USDA's February 15 Hatchery Report, two percent fewer breed poults were produced in January, and 11 percent fewer heavy breed eggs were in incubators than a year earlier. However, in view of the potentially large supply of hatching eggs, these reductions could easily be more than offset by heavier hatching during the remainder of the season. Farmers' intentions, as of January 1, also indicated growers were planning to produce about the same number of heavy turkeys this year as last.

COMING CONVENTIONS

AMERICAN WAREHOUSEMEN'S ASSOCIATION
April 12-16, 1955
Edgewater Beach Hotel, Chicago, Ill.
WM. K. DALTON, General Secretary

NATIONAL ASSOCIATION REFRIGERATED WAREHOUSES
April 12-16, 1955
Edgewater Beach Hotel, Chicago, Ill.
WM. K. DALTON, Exec. Vice-Pres.

REFRIGERATION RESEARCH FOUNDATION
April 12, 1955
Edgewater Beach Hotel, Chicago, Ill.
H. C. DIEHL, Director

MOUNTAIN STATES ASSOCIATION OF ICE INDUSTRIES
April 21-23, 1955
Brown Palace Hotel, Denver, Colo.
J. REIMER ESPY, Secretary.

NAPRE MIDWEST REGION ENGINEERS CONFERENCE
April 30-May 1, 1955
Congress Hotel, Chicago, Ill.
BERT C. MCKENNA, Chairman
WM. L. TIFFIN, Sec., 37 W. Van Buren St., Chicago

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS
November 8-10, 1955
Ambassador Hotel, Los Angeles, Calif.
RICHARD J. KELAHAN, Secretary

NATIONAL ASSOCIATION OF ICE INDUSTRIES
November 15-18, 1955
Biltmore Hotel, Los Angeles, Calif.
GUY W. JACOBS, Exec-Secy.

Refrigeration Adapted To Changing Progress

(continued from page 18)

orator, which can separate 750 gallons of alcohol and water per hour, uses a two-cylinder 12 × 12 Frick compressor driven by a 250-hp motor. Another evaporator with capacity of 400 gallons per hour requires a two-cylinder 9 × 12 compressor with a 150-hp motor. A small evaporator used principally for research purposes is served by a Frick two-cylinder 7 × 7, 50-hp compressor.

Steam ejectors, which pull the vacuum on the evaporator, are made by Graham Manufacturing Company. The ejectors are designed for a steam pressure of 100 psi, but the plant reduces the pressure of line-steam from 175 to 125 psig and then feeds it to the ejectors.

Center of Activity

The new Pharmaceutical Center is the hub of Armour Laboratory's biochemical production. The plant employs about 550 persons with a high percentage of chemists and biochemists. The Kankakee plant is an extension of Armour's facilities in Fort Worth and is the new site of many operations formerly performed in Chicago.

From Armour packing houses come the frozen pancreas, liver products, thyroid and other organs by the ton, to supply raw materials for the plant. The extent of refining in the manufacture of some products may be illustrated by the fact that about 6,000 pounds of raw materials go into the manufacture of 10 lbs of insulin. Three average diabetic patients would use 10 lbs in a year.

The crucial nature of refrigeration in both the storage and manufacture of products of the Laboratory influences both the design and operation of this type of plant.

Philadelphia Warehouse

(continued from page 21)

out of the horizontal line "E", there is no chance for this line to become fouled.

The column of ammonia gas between the relatively fluid boiling liquid ammonia and the relatively viscous non-boiling oil acts as a cushion and thus produces a very smooth and stable oil column to operate the float switch and indicate the liquid level.

To economically maintain return air temperatures in the freezing tunnel as low as minus 35 F definitely requires two stage operation. A Fuller two-speed rotary compressor was selected for the first, or low stage. The plant's existing single acting vertical Frick compressors are used for the high stage. The cycle of operation for this quick freezing system is as follows:

First, the room is loaded, using care to arrange the products properly for good air circulation through the stacks. The room is then closed up and the fans are started. The high stage compressors are used to lower the room temperature to about 10 F. The rotary booster compressor is then started and operated at full speed until the room temperature is reduced to about minus 35 F. The booster is then operated at half speed until the products in the room are completely frozen. Coils are defrosted at the time the room is being unloaded and reloaded, so that the next cycle can begin immediately after reloading.

This quick freezing system in connection with the cold storage plant is reported to be a profitable operation. Customers indicate that this installation is doing a fine job of quick freezing the various products handled.

American Standards Listed

A LIST of American Standards, 1955 edition, has just been published. The 48-page publication lists and indexes about 1500 American Standards. There are 210 for construction and civil engineering, 153 mechanical, 272 electrical, 158 safety, 165 textiles and wearing apparel, 251 photography and motion pictures, 74 petroleum products, 69 chemical, 62 metallurgy, 38 gas-burning appliances, 32 drawings, letter symbols and abbreviations, 18 mining, 11 rubber, 10 office equipment and supplies, and a miscellany of others.

A separate section on consumer goods contains an index of standards for household appliances and furnishings, wearing apparel, hobby cameras, etc. Free from the American Standards Association, 70 East 45 Street, New York 17.

Fish Freeze Annex

PLANS are being considered by Vernon Moore for a 60 x 60 ft concrete block annex to the fish viscera freezing plant in LaConner, Wash. Sharp freezing operations would be moved from Mount Vernon. The annex would contain equipment for a 30 x 50 ft sharp freeze, also hoppers, truck scales, and a work room.

Storage Survey Optimistic

(continued from page 31)

benefit from refrigerated storage and can be classified as new business. Examples are green coffee and roasted ground coffee, brown sugar, preserves and jellies, and cocoa powder. Very much improved egg powders, orange powder, tomato powder and powders from other fruits and vegetables have been recently developed. Impact of these new developments on refrigerated storage is difficult to assess. Some of these may even require refrigerated storage. Perhaps the storage of Army ration items under refrigeration will open the door for controlled storage of other canned goods.

Radiation: Opinion at present is that if electronic or atomic radiation will have any effect upon our industry, it will be favorable rather than unfavorable. Pasteurization of these methods appears to be more feasible for foods than sterilization. This pasteurization with subsequent refrigeration could make possible much longer marketing times or seasons for many perishables. Treatment of plant products by radiation to control such phenomena as potato sprouting opens the door to other possibilities with floricultural products, but much research remains to be done.

Refrigeration is definitely an important phase of our present industrial expansion. It is a known and expanding favorable influence in our food supply lines, making possible the availability of many foods at long distances from point of production and out of season. The outlook for enlarged usefulness of refrigeration is very definitely buoyant and expanding.

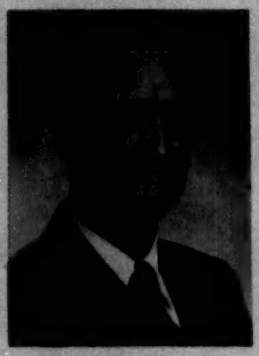
Ohio Offers to Modernize Cold Storage Law

A BILL is now before the State Legislature of Ohio which, if it becomes law, will make Ohio the fourth state to modernize its refrigerated warehousing law. The bill, which is supported by both the Ohio Department of Agriculture and refrigerated warehouses in the state, is patterned after the New Jersey law. It provides for annual license fees ranging from $50 to $150, establishes a storage time limit of 24 months which may be extended on approval of the state Department of Agriculture, provides for removal of goods which may have become unfit, and sets up certain record keeping requirements.

News of People

Robinson Joins Railways Ice

EFFECTIVE February 16, 1955 F. M. Robinson was appointed assistant general manager of Railways Ice & Service Company, with headquarters in Chicago. For some twenty



F. M. Robinson

years Mr. Robinson has been employed by the Santa Fe in the refrigerator department, his most recent title being General Agent, SFRD, with office in Topeka. He was formerly on the Western Lines at Amarillo.

TED HOOVER of Greater Miami has been appointed chief engineer at the New Bal Harbour Hotel at Miami Beach, it is announced by Milton W. Chapman, managing director. Mr. Hoover received his apprentice training with Westinghouse in Schenectady, spent two and a half years with Bethlehem Steel, two years with DuPonts in Wilmington, went with Youngstown Sheet and Tube, and was in business for himself in his home town, Harrisonburg, Va. He is president of the new Dade County Chapter, NAPRE.

HAROLD J. PREBENSEN, President, Air Comfort Corp., Chicago, was elected to the ASRE national nominating committee at the December meeting of the Society in Philadelphia. Mr. Prebensen is a past-chairman, Chicago Section.

SHEFFIELD A. KADANE has been elected chairman of the Southwest Chapter of the National Association of Refrigerated Warehouses. Election was held at New Orleans at a joint meeting of the Southwest and Southeast Chapters. Mr. Kadane is owner of the Pure Ice and Cold Storage Company, Dallas, Texas.

DEATHS

William J. O'Brien

THE death of William J. O'Brien, Chicago Branch supervising engineer for refrigeration, Creamery Package Manufacturing Company, occurred from a heart attack, Monday February 28, at Lutheran Deaconess Hospital, Chicago. He was 78 years old.

"Billy" O'Brien started with Creamery Package 57 years ago in 1898 when the company acquired A. H. Barber and Company. He had installed CP refrigeration and ice making plants in Mexico, Canada and throughout the United States. He had a host of friends who knew him for his unequalled experience and practical refrigeration knowledge, but most of all, they knew and will remember him as a good natured friend with a twinkle in his eye and a cigar in his mouth.

Funeral services were held Friday, March 4. He is survived by a daughter, Mrs. Violet Delano of Chicago; and two grandchildren: Mrs. Carol Dempsey and William Delano, an erecting engineer for CP Chicago Branch.

FRITZ HANK, an engineer for Consumers Ice Company, Jersey City, N. J. died March 1, at his home in West New York. He was born in Hamburg, Germany but had been in the United States more than 50 years.

MANUFACTURERS' NEWS

Duffy Named New Jamison Sales Manager

THE appointment of Patrick J. Duffy as general sales manager of the Jamison Cold Storage Door Company, Hagerstown, Md. has been announced. In his new position he will direct sales of both the company's Cold Storage Door Division and Engineered Door Division. Mr. Duffy succeeds the late Fred H. Wagner, Jr., who was Jamison sales manager for more than 15 years.

Patrick J. Duffy

Until Wagner's recent death, he had served as assistant sales manager on assignments outside his own Baltimore-Washington sales territory. He joined Jamison in 1941 as a member of the sales force, and served until his recent home office appointment as Jamison sales representative in the Baltimore and Washington area.

Before he started with Jamison, he was employed in sales promotion work in the New York area by the Frigidaire Division of General Motors Corporation. He is current secretary of the Baltimore-Washington Section, American Society of Refrigeration Engineers.

York Corp. Report

THE proposed expansion of its West York (Roosevelt Avenue) plant, completion of major building developments at the Grantley shops, the development of new products and the disclosure of a financial loss during the first quarter of its new fiscal year were outlined by York Corporation at a stockholders meeting January 28.

The company has made an appropriation of $1,145,309 for plant expansion at the West York area to "streamline production." President Lauer assured the stockholders that the project was designed to increase production and decrease costs of operation.

The three major improvements at the Grantley plant include construction of an addition along Grantley road, 60 x 550 feet, an increased assembly capacity designed to nearly double capacity and a complete revamping of the parking area.

The stockholders reflected considerable interest and enthusiasm in the company's development of new major products, which are to be featured by a centrifugal refrigeration machine of a rotary type of between 100 and 350 hp and new residential air conditioning units hermetically sealed.

Vilter Trainee Returns to India

A FOREIGN trainee in the export department of the Vilter Manufacturing Company, Milwaukee, Felix J. Veliath, has returned to his home in Cochin, India. He joined Vilter early in 1952 for a training program in his chosen specialty of refrigerating engineering. During his journey home he will visit a number of Vilter foreign distributors in Europe and the near east and at home will promote mechanical refrigeration in Madras province of India.

New Insulating Blocks With Ceramic Finish

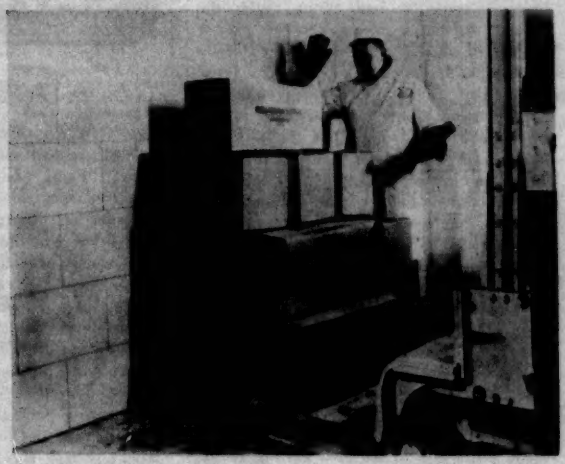
THE development of a ceramic finish for their cellular glass insulating material, both fused into a single unit, has been announced by Pittsburgh Corning Corporation. Called "Duraface Foamglas", the new finish, according to the manufacturer, provides a durable, impact-resisting surface for the insulating and moisture-proof qualities of the material.

With the new material, a wall completely insulated and surface-finished can be erected in one operation (see illustration). No finish coating is required to protect the insulation. Unsupported walls can be built of the blocks because of their rigidity and high compressive strength.

Like regular "Foamglas", the material is completely inorganic. Thus, it is not affected by fungus. "Duraface Foamglas" walls are easily washed down. Being made of pure glass, the material is resistant to nearly all chemicals. While the white ceramic surface needs no paint or other surface finish for durability and architectural appearance, various types of paint can be applied.

The dual-purpose insulation blocks are

Newly developed "Duraface Foamglas" combines insulation and hard surface finish in one unit, reducing installation to one operation. Blocks are applied with hot asphalt or a cold adhesive.



Refrigerated room for storage or processing of meat, permanently insulated with the newly developed "Duraface Foamglas" which has a built-in ceramic surface finish resistant to impact.

Our neighbors didn't like us ... until we bought an ARMSTRONG PURGER

Gentlemen:

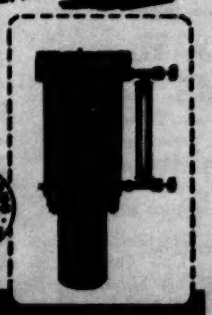
We used to have hand run purgers. These would fill up and run over, losing a lot of ammonia. Our head pressure would be up and down. At times we would have to shut the engine room down and purge from the top of the condensers and lose a lot of ammonia. Our neighbors did not like this.

Now we have an Armstrong purger and our troubles have ceased.

Chief Engineer
____ Ice Cream Co.
Detroit, Michigan*

* Name on Request

You won't smell up the neighborhood when you have an Armstrong Purger. It gets *all* the non-condensibles out of your refrigerant system with *negligible refrigerant loss.* Head pressures remain within a few pounds of theoretical. Bulletin No. 221, gives full facts. Send for your copy.

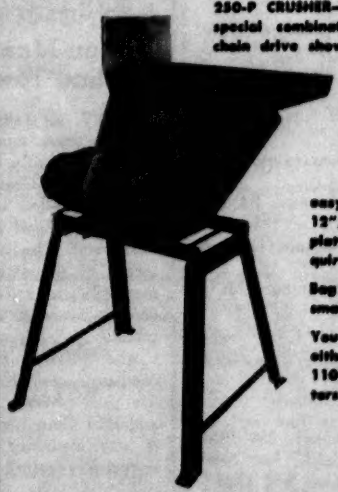


ARMSTRONG MACHINE WORKS
860 Maple St., Three Rivers, Mich.

ARMSTRONG FORGED STEEL PURGERS

ESKIMO Ice Crushers

The Finest, Most Economical Crusher Built Today — With Real Low Snow Content.



250-P CRUSHER—This unit is driven by a special combination of Two V-Belts and chain drive shown in the inset picture by a ¾ HP motor. Made from heavy steel plate, heavily zinc coated, self aligning ball bearings. The 50 lb. hopper opening is 12" x 13½" and also has a platform for easy loading. Drum size, 8" x 12"; height to the loading platform 47"; floor space required 31" x 32½".

Bag loading chute available at small additional cost.

You may get this motor in either 1 phase or 3 phase, 110/220 or 220/440 volt motors.

WRITE FOR CATALOG

BALLARD SALES COMPANY

COMPLETE SUPPLIERS TO THE ICE INDUSTRY

manufactured by integrally-fusing the dense face with regular "Foamglas." This, according to Pittsburgh Corning engineers, eliminates any possibility of the surface finish peeling or cracking off. Maintenance costs for an insulated wall of the material will be substantially less than for a wall with surface coatings of plaster or other finish. The material cannot burn and will not transmit fire.

Impact tests on the dense face of the material show it has about twice the impact resistance of a cement plaster finish. The dual-purpose blocks are easily installed with either straight or staggered joints. Hot asphalt or a cold adhesive may be used. Where necessary, the blocks can be cut and trimmed on the job site. Like regular "Foamglas", the closed cellular structure of the new material is a natural vapor barrier and absorbs no moisture that would reduce its insulating efficiency.

Vending Machine Installations

THE S & S Vending Machine Company of San Jose, California reports sales to date 1955 to be greater than the same period of 1954. Following is a list of recent shipments to ice men getting ready for the coming season:

Geo. Bennett Ice Service, Willow Grove, Pa. one 8 × 16.

Gorden Frozen Food Co., New Hartford, N.Y. one 8 × 20.

New West Florida Ice Co., Sarasota, Fla. two 8 × 16.

Middle Florida Ice Co., Tallahassee, Fla. one 9 × 16.

All Season Ice Co., Jacksonville, Fla. two 9 × 16.

Bahrenburg Ice Co., Trenton, N.J. two 8 × 20.

Media Coal & Ice Co., Media, Pa., one 6 × 10.

Gadsden Ice & Fuel, Gadsden, Ala. three 8 × 16.

Pure Ice Co., Daytona Beach, Fla. one 8 × 20.

Ice Service Co., Kansas City, Mo. two 9 × 24.

J. G. Liebmann, Oklahoma City, Okla. six 8 × 20.

Dublin Locker Co., Daylestown, Pa. one 8 × 20.

American Service Co., Atlanta, Ga. two 9 × 24.

Patterson Bros. Ice., Greenboro, N.C. one 6 × 10.

Union Ice Named Bally Distributor

THE UNION ICE Company, 354 Pine St., San Francisco, Calif., has been franchised by the Bally Case and Cooler Co., Bally, Pa., to distribute Bally's entire line of refrigerated cases and coolers. Union Ice, one of the oldest and largest ice service organizations in the country, operates throughout the states of California and Nevada. It has plants and facilities in 58 cities.

Union's activity in the refrigeration field dates back to 1882 when it came into existence as an ice delivery plant. The company played an important part in the development of California's great fruit and vegetable industry by devising improved methods for refrigerating and transporting the valuable crops to markets. In addition, it was a pioneer in the development of methods for quick freezing foods. Today, Union Ice is the largest processor, storer and distributor of frozen foods in the West.

CATALOGS AND BULLETINS

Gas vs Electric Fork Trucks

A NEW folder has been issued by Lewis-Shepard Products, Inc., Watertown, Mass., "Facts About Fork Trucks — The Gas vs. Electric Question." This folder presents an objective study of the capabilities of gasoline and electric powered fork trucks operating under normal conditions. The folder contains 12 "Fact Sheets" —plus two industrial truck maintenance report forms which enable user to keep an accurate breakdown of labor, parts and power costs for both gasoline and electric trucks. The "Fact Sheets" are a digest of information published by several users and manufacturers of both gasoline and electric trucks. These sheets answer many of the questions about cost, dependability, service life and the relative merits of gasoline and electric power. The Spring issue of "The Lever," the Lewis-Shepard magazine, is now available to industry. Fully illustrated, this issue features interesting applications of both hand and electric trucks in the following industries: Grocery Warehousing, Cold Storage Warehousing, Motor Freight, Bottling, Textiles, Drum Handling, Die Handling and Paper Handling. Also included is the announcement of two new trucks, a short "Walkie" Electric Pallet truck and a Narrow Electric Riding Type Straddle truck.

Design Manual For Cooling Tower Pumps

A NEW six-step manual for sizing cooling tower pumps and piping was introduced recently by Bell & Gossett Company, Morton Grove, Ill. manufacturers of hot and chilled water circulating equipment, centrifugal pumps and refrigeration equipment. The new 8-page manual, by means of six simple steps, tells how the most efficient and economical selection of cooling tower pump and piping can be made.

Also released at the same time was the company's newly revised selection chart and list price sheet CSP-155 on Series 1522 and 1531 Centrifugal Pumps. These pumps, it was explained, are particularly well suited for cooling tower systems.

New Vogt Bulletin

A NEW Bulletin LR-1 has been issued by Henry Vogt Machine Company, Louisville, Ky., covering Vogt Liquid Receivers for Ammonia and Freon. Various applications are pictured and tables showing specifications are included.

Compressor Erection Paper

REPRINTS of an article entitled "Non-Portable Compressors — Installation and Maintenance Guide" by H. W. Whiting, Worthington Corporation, are available. Among the topics covered are: Location; Foundation-shaking forces; Soil considerations; Foundation Construction, including bolt material and reinforcement; Piping; Location of Intercoolers and receivers; Lubrication and Inspection and maintenance information.

Mr. Whiting's article, which appeared in Worthington's publication, POWER and FLUIDS, is known as RP-725. Although the paper deals principally with air compressors, much of the information is directly applicable to refrigerating systems. "The Locomotive", a quarterly magazine published by the Hartford Steam Boiler Inspection and Insurance Co. in its January, 1955 issue, features two similar articles to Mr. Whiting's except that emphasis is also placed on other major components of the system, in addition to the compressor. That magazine is available to owners and operators of power machinery.

Bulletin on Recording and Controlling Instruments

A NEW 4-page bulletin (GL-1) summarizes the Gotham line of indicating, recording and controlling instruments made by United States Gauge Div. American Machine & Metals Inc., Sellersville, Pa. Covered in bulletin are various types of industrial thermometers, in ranges from −40 F. to 950 F.; dial thermometers, −300 F. to 1200 F.; Gotham recorders for pressure temperature and humidity; pressure records in ranges from 30 inch vacuum to 50,000 psi; temperature recorders from −300 F. to 1200 F. Also included are portable running time-temperature recorders, electric recording controllers and alarms, pneumatic off-on indicating controllers, and pneumatic proportional recorders for 1 to 100 percent proportional band.

Catalog on Graloc Pipe Connections

A CATALOG on Graloc Universal pipe connections has been issued by the Gray Tool Company, Houston, Texas. The catalog, of 12 pages illustrates and describes the Graloc line, tells how to specify pipe connections, and includes price list on a separate sheet.

Classified Advertising

All classified advertisements are payable in advance. Except for Positions and Help Wanted classifications, this section is reserved exclusively for USED equipment.

RATES: 20¢ per word; minimum 25 words. $2.00 per line for bold face headings: $15.00 per inch for line listings.

USED EQUIPMENT—wanted & for sale

FOR SALE
10x10 York direct connected to 125 h.p. 360 r.p.m. motor.
10x10 York direct connected to Unaflow steam engine.
9x9 York direct connected to 75 h.p. 300 r.p.m. motor.
9x9 Frick V-belt drive.
7½x7¼ Baker V-belt drive.
5x5 York V-belt drive 20 h.p. motor.
Uline ice scoring machine —new 1947.
130 h.p. Superior Diesel engine 600 r.p.m.
Two 18"x18' enclosed condensers with receiver.
Type 50 F & E Cuber — 15 & 10 h.p. Freon condensing units — ice cans — blowers — etc.
"A" & Venango Sts., Philadelphia 34, Pa.
GArfield 6-2221

FOR SALE—500 ton refrigeration equipment for ice stadium or enterprise demanding big tonnage; excellent condition, genuine bargain. Born Company, 80 East Jackson Blvd., Chicago 4, Ill. WAbash 2-3299.

FOR SALE—10"x7" Worthington Booster compressor. 3x3, 4x4, 5x5, 8x8 and 9x9 Yorks, splash lubrication. Write E. Neibling, 1546 St. Clair Ave., Mt. Healthy, Cincinnati 31, Ohio.

FOR SALE—2 high speed 8x8 York ammonia compressors complete with motors and V belts. Write P.O. Box 1093, New Haven, Conn.

FOR SALE—USED ICE PLANTS & REFRIGERATING EQUIPMENT
Complete Ice Plants 20 to 100 Tons
Ammonia Compressors, 3" x 3" to 12½" x 14½"
Condensers, Cranes, Blowers, Scoring Machines, Ice Canes—Various sizes. 100# — 500# Ice Cubers.
Write or wire us on any equipment you may need.
ENTERPRISE EQUIPMENT CORPORATION
77-79 Alexander Street, Yonkers, New York
Cable Add.: ENECO Ph.: Yonkers 5-8118-9

WANTED—Good used automatic ice cubing machine. Write us, giving full details. Abso-Pure Ice & Coal Company, 136 East 8th, Peru, Indiana.

SALE! AMMONIA COMPRESSORS
We are the largest dealers handling used brewery refrigeration equipment. Here are a few of the compressors erected in our breweries. Remember, each brewery has ammonia compressors, shell and tube condensers, evaporative condensers, ammonia pipes, receivers, etc. Whatever your requirements, we will be glad to give you additional details, prices and option for inspection.
1—York 10x10 twin cylinder, single acting compressor, 150 h.p., 360 r.p.m. induction 2 years old, located Pittsburgh.
1—New "BAKER" Duplex 2-10½x10½ compressors, 200 h.p. Ideal synchronous, never used, located Chicago.
2—Frick 6x6 compressors, Ideal 30 h.p. AC, located Ohio.
1—York 8x8, 25 h.p., AC motor, located Ohio.
1—7½x7½ twin cylinder, Crocker Wheeler, 30 h.p., located Michigan.
1—York Model D-6, 6x6 twin cylinder, 25 h.p. Century, located Michigan.
1—Vilter 7½x7½ twin cylinder, 50 h.p. Century located Michigan.
1—Vilter duplex; 2-10½x10½ compressors, 250 h.p. synchronous; located eastern Penna.
1—York 2 cylinder, 11½x10 compressor, like new; located Tennessee.
Tell us your requirements. Also, if you have surplus equipment, we pay highest cash prices.
CHARLES S. JACOBOWITZ CORPORATION
3080 Main St. Buffalo 14, N.Y. U.S.A.
Phone AMherst 2100

FOR SALE—Fairbanks Morse Diesel engines. 1-150 h.p., 300 r.p.m., model E 36-3 cyl. with 60 KVA generator and 1-300 h.p., 257 r.p.m., needle bearing, type Y-VA, 6 cyl. 14x17 with 300 KVA generator. Both engines in excellent condition. St. Augustine Ice Co. Inc., P.O. Box 1080, St. Augustine, Fla.

FOR SALE—1 Vilter 16"x16' condenser, 1¼" tubes. 2 York 14"x14' condensers, 1" tubes. Above nearly new. 1 condenser, 48-2" tubes 20', 24x20. Priced to sell. Refrigeration Service Co., 1547 Blake St., Denver 2, Colo.

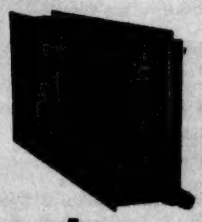
FOR SALE—Late model Frick 6x6 with motor and vee belts, also 7½x7½, 8x8, 9x9, 10x10, ice plants, cans, cranes, agitators, blowers, Diesels. Parke Pettegrew, 370 West Broad St., Columbus 8, Ohio.

QUICK RESULTS with Classified Ads

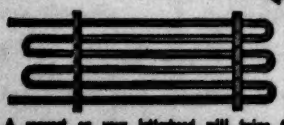
The classified section is the market place of the industry. Get fast action on equipment you want to buy or sell. Buyers are watching for equipment they can use. Convert idle equipment into cash. INDUSTRIAL REFRIGERATION classified rates are low — results quick.

LOOK TO REMPE
PIPE COILS—FIN COILS
FOR REFRIGERATION, AIR CONDITIONING, HEATING

Rempe Coils are accepted in the industry as quality equipment that is built for long service without maintenance. Rempe Coils are used on the most difficult jobs and forgotten. This confidence has been earned the hard way—through proper engineering, good quality materials and precision manufacturing.



Coils and Bends of any metal or design engineered to your requirements. Send us your problems for engineering assistance.



A request on your letterhead will bring free copy of new Engineering Data Book on Pipe and Fin Coils.

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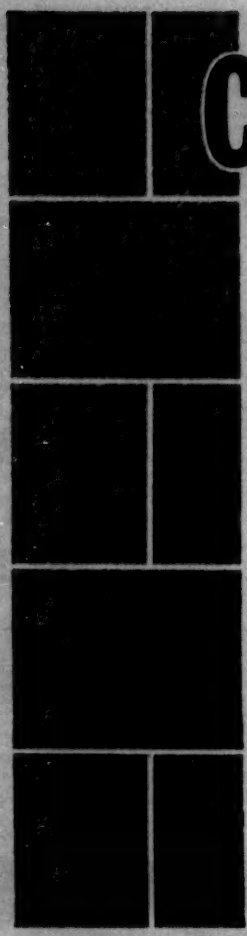

CORKBOARD

FOR LOW TEMPERATURE INSULATION

- Corkboard forms an extremely efficient barrier to heat and, when properly installed, retains its initial low K factor.
- Corkboard has no capillary attraction for moisture, hence doesn't rot, swell, warp or support bacterial growth.
- Corkboard is fire retardant; insect, vermin resistant.
- Corkboard is structurally strong, yet flexible—saves space.
- Corkboard is light in weight; installs easily, works like lumber. Bonds tightly with cement, paint, hot or cold asphalt.

UNITED

FOR A COMPLETE INSTALLATION

Your nearby United Cork Companies branch office provides a *complete* corkboard service . . . *from product to final installation* . . . to meet your individual needs. Trained engineers are available for consultation . . . or will design every detail of your job. If you desire, our skilled work crews, supervised by the same engineers, will erect your installation. Our patented BB (block-baked) Corkboard is specially prepared for low temperature work. It's *all* cork without added fillers or binders. The straight-edged slabs of corkboard fit accurately, can be bonded to most common structural materials with low cost, readily available bonding materials.

For close to half a century, United Cork Companies' products and services have been geared to the needs of refrigeration engineers and plant operators. This experience assures the satisfactory performance of *your* BB Corkboard installation . . . today and for years to come.

For complete information . . . WRITE

UNITED BB CORKBOARD

SEE OUR CATALOG IN SWEET'S

UNITED CORK COMPANIES

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Manufacturers and erectors of cork insulation for almost a half century

Engineering and installation offices, or approved distributors, in key cities — coast to coast.

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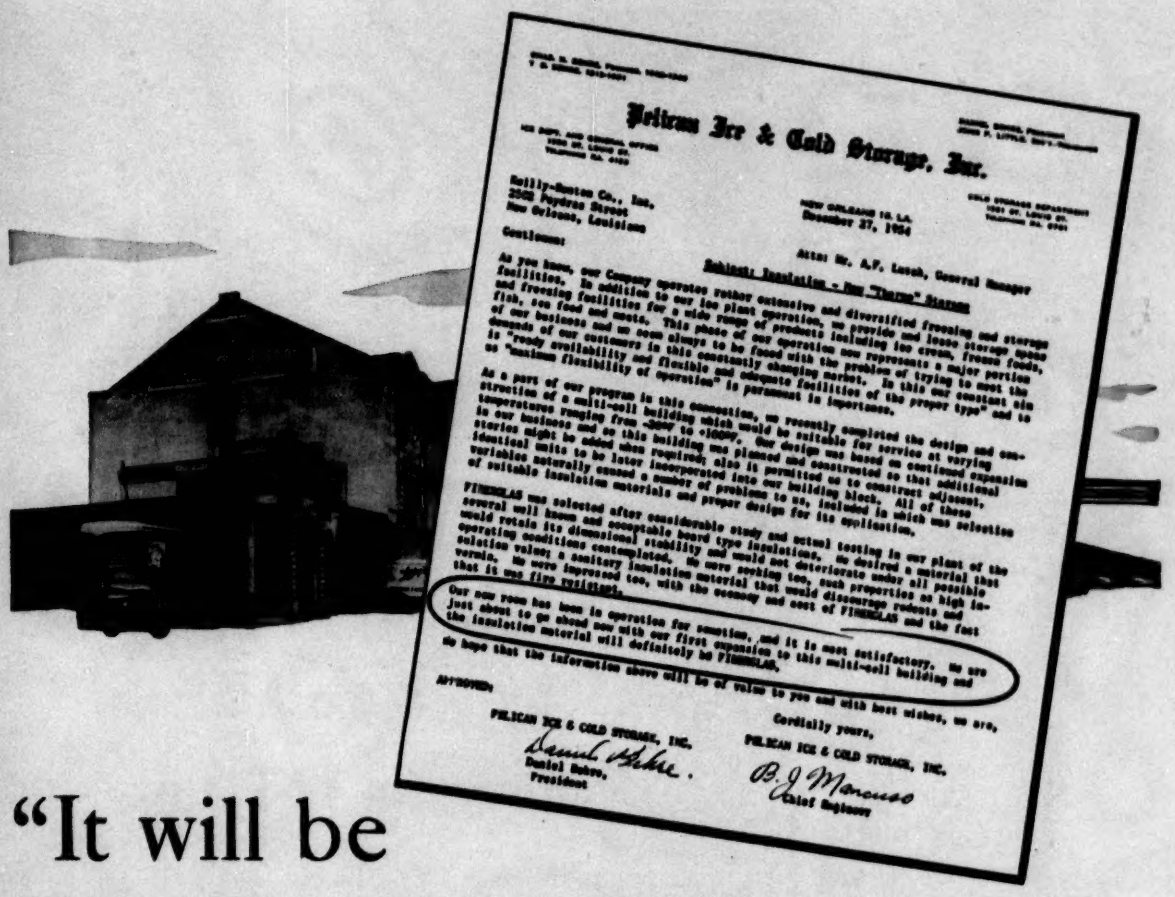


Pelican Ice & Cold Storage, Inc.

NEW ORLEANS 16, LA.
December 27, 1954

Kelly-Benton Co., Inc.
2508 Poydras Street
New Orleans, Louisiana

Gentlemen:

Attn: Mr. A.F. Leach, General Manager

Subject: Insulation - Pan "Thermo" Starrett

As you know, our Company operates rather extensive and diversified freezing and storage facilities. In addition to our ice plant operation, we provide and lease storage space and freezing facilities for a wide range of products including ice cream, frozen foods, fish, sea food and meats. This phase of our operation now represents a major portion of our business and we seem always to be faced with the problem of trying to meet the demands of our customers in this constantly changing market. In this our constant aim is "ready availability and flexible and adequate facilities of the proper type" and to us "maximum flexibility of operation" is paramount in importance.

As a part of our program in this connection, we recently completed the design and construction of a multi-cell building which would be suitable for service at varying temperatures ranging from -20°F to +100°F. Our design was based on continued expansion in our business and on this building was planned and constructed so that additional stories might be added when required; also it permitted us to construct adjacent, identical units to be later incorporated into our building block. All of these variables naturally caused a number of problems to us, included in which was selection of suitable insulation materials and proper design for its application.

FIBERGLAS was selected after considerable study and actual testing in our plant of the several well known and acceptable board type insulations. We desired a material that would retain its dimensional stability and would not deteriorate under all possible operating conditions contemplated. We were seeking too, such proportion as high insulation value, a sanitary insulation material that would discourage rodents and vermin. We were impressed too, with the economy and cost of FIBERGLAS and the fact that it was fire resistant.

Our new room has been in operation for sometime, and it is most satisfactory. We are just about to go ahead now with our first expansion to this multi-cell building and the insulation material will definitely be FIBERGLAS.

We hope that the information above will be of value to you and with best wishes, we are,

APPROVED:

Cordially yours,

PELICAN ICE & COLD STORAGE, INC.
Daniel Bobro,
President

PELICAN ICE & COLD STORAGE, INC.
B. J. Mancuso
Chief Engineer

"It will be Fiberglas again,"

says New Orleans cold storage plant engineer after first use of PF Dry Wall Construction

B. J. Mancuso
Chief Engineer

Pelican Ice and Cold Storage, Inc., of New Orleans, constructed a unique basic building unit containing "cells" for storing foods at temperatures ranging from *minus 20° to plus 100° F.*

The problem of insulation came in for intensive study. As Chief Engineer B. J. Mancuso summed up the situation, they sought a low-cost material that "would retain its dimensional stability . . . would not deteriorate . . . had high insulation value." Tests were made on several insulations.

In addition to meeting these requirements, Fiberglas PF Dry Wall also provided *fire-safety*. As a final test, it was installed in the initial multi-cell building unit. Results were so successful that in the expansion program now under way, "*the insulation material will definitely be Fiberglas.*"

Every storage or freezing plant management thinking of building or modernizing should have the facts about this amazing Fiberglas development. Send the coupon today and get them for yourself! Owens-Corning Fiberglas Corporation, Toledo 1, Ohio.

FIBERGLAS

*T. M. Reg. Owens-Corning Fiberglas Corporation

Owens-Corning Fiberglas Corporation
Dept. 165-D, Toledo 1, Ohio

Please send me the literature I have checked.

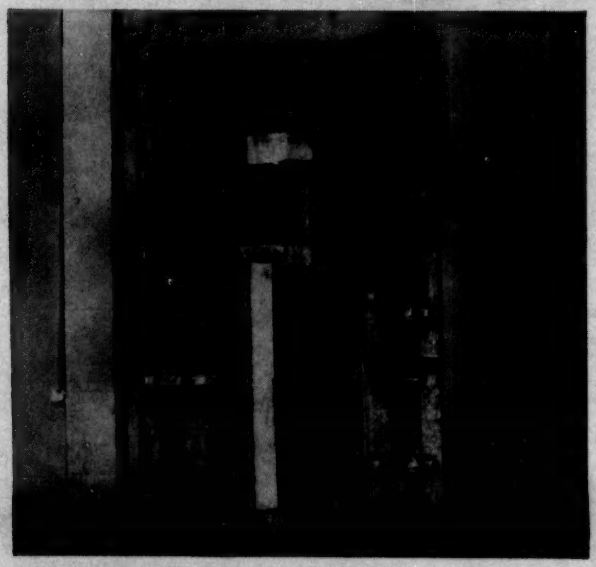
- ☐ "Insulation for Low Temperature Structures and Equipment"
- ☐ "PF Design Details"
- ☐ "Why the Trend is to Fiberglas"

Name and Title_____

Company_____

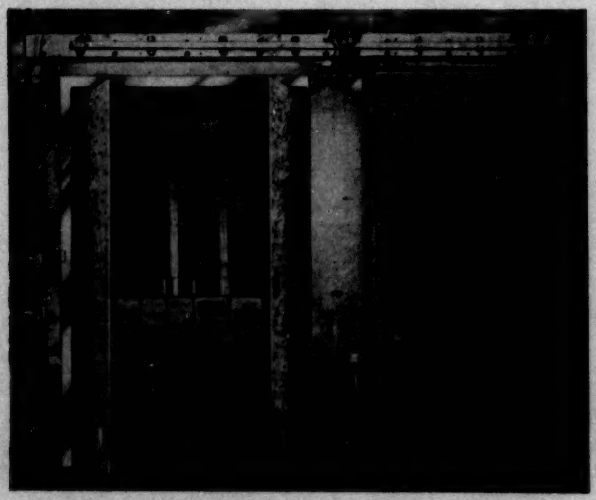
Street_____

City_____ Zone_____ State_____

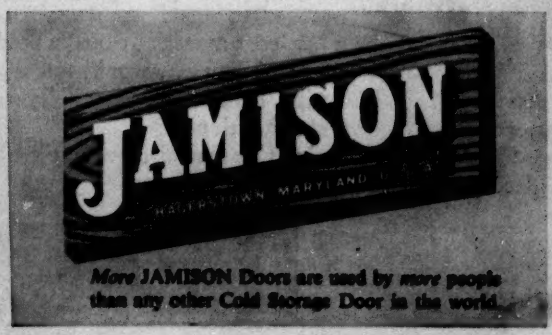


There's a JAMISON Cold Storage Door for every use and every purpose. As suggested by these illustrations, Jamison doors do the job at the Fosgate Citrus Concentrate Cooperative, Orlando, Florida.

When floor space is at a premium, and high building costs dictate space savings, investigate the possibilities of a JAMISON Horizontal Sliding Door such as this.



Fosgate Citrus Keeps Efficiency High by use of JAMISON Doors in 12 Places

Vestibule doors, sliding doors, big doors for fork-truck traffic, and small doors for personnel movement all have a place in a modern citrus concentrate plant or any other place where food must be stored and handled. And when conditions are critical or super-efficiency is required a "best-choice" is a JAMISON Cold Storage Door.

Jamison engineers and builds a door to suit your exact needs and requirements. Consult your architect or write, JAMISON COLD STORAGE DOOR CO., HAGERSTOWN, MARYLAND, U.S.A.